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Where Futures Converge
Kendall Square and the Making of a Global Innovation Hub
Robert Buderi

The evolution of the most innovative square mile on the planet: the endless cycles of change and reinvention that created today's Kendall Square.

Kendall Square in Cambridge, Massachusetts, has been called "the most innovative square mile on the planet." It's a life science hub, hosting Biogen, Moderna, Pfizer, Takeda, and others. It's a major tech center, with Google, Microsoft, IBM, Amazon, Facebook, and Apple all occupying big chunks of pricey office space. Kendall Square also boasts a dense concentration of startups, with leading venture capital firms conveniently located nearby. And of course, MIT is just down the block. In *Where Futures Converge*, Robert Buderi offers the first detailed account of the unique ecosystem that is Kendall Square, chronicling the endless cycles of change and reinvention that have driven its evolution.

Buderi, who himself has worked in Kendall Square for the past twenty years, tells fascinating stories of great innovators and their innovations that stretch back two centuries. Before biotech and artificial intelligence, there was railroad car innovation, the first long-distance telephone call, the Polaroid camera, MIT's once secret, now famous Radiation Laboratory, and much more. Buderi takes readers on a walking tour of the square and talks to dozens of innovators, entrepreneurs, urban planners, historians, and others. He considers Kendall Square's limitations—it's "gentrification gone rogue," by one description, with little affordable housing, no pharmacy, and a scarce middle class—and its strengths: the "human collisions" that spur innovation.

What's next for Kendall Square? Buderi speculates about the next big innovative enterprises and outlines lessons for aspiring innovation districts. More important, he asks how Kendall Square can be both an innovation hub and a diversity, equity, and inclusion hub. There's a lot of work still to do.
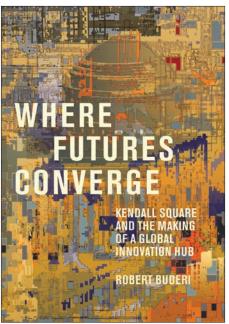
Robert Buderi is an author, journalist, and entrepreneur. He is the author of *Engines of Tomorrow*, *The Invention That Changed the World*, and other books, former Editor-in-Chief of *Technology Review*, and founder of the media company Xconomy.

Born in Cambridge

400 Years of Ideas and Innovators

Karen Weintraub and Michael Kuchta

Anne Bradstreet, W.E.B. Du Bois, gene editing, and Junior Mints: cultural icons, influential ideas, and world-changing innovations from Cambridge, Massachusetts.

Cambridge, Massachusetts is a city of "firsts": the first college in the English colonies, the first two-way long-distance call, the first legal same-sex marriage. In 1632, Anne Bradstreet, living in what is now Harvard Square, became the first published poet in British North America, and in 1959, Cambridge-based Carter's Ink marketed the first yellow Hi-liter. W.E.B. Du Bois, Julia Child, Yo-Yo Ma, and Noam Chomsky all lived in Cambridge at various points in their lives. *Born in Cambridge* tells these stories and many others, chronicling cultural icons, influential ideas, and world-changing innovations that all came from one city of modest size across the Charles River from Boston. More than 200 illustrations connect stories to Cambridge locations.
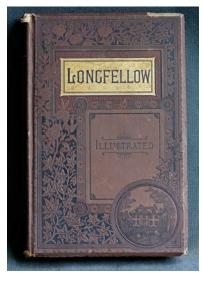
Cambridge is famous for being home to MIT and Harvard, and these institutions play a leading role in many of these stories—the development of microwave radar, for example, the invention of napalm, and Robert Lowell's poetry workshop. But many have no academic connection, including Junior Mints, Mount Auburn Cemetery (the first garden cemetery), and the public radio show *Car Talk*. It's clear that Cambridge has not only a genius for invention, but a genius for reinvention, and authors Karen Weintraub and Michael Kuchta consider larger lessons from Cambridge's success stories—about urbanism, the roots of innovation, and nurturing the next generation of good ideas.

Karen Weintraub is a journalist, now working as health reporter at *USA Today*. Her work has appeared in the *New York Times*, the *Washington Post*, *Scientifc American*, and *STAT* and she is the coauthor of *The Autism Revolution* and *Fast Mind*. **Michael Kuchta** is an architect and campus planner.

history

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978-0-262-04680-0

Cover of *The Poetical Works of Henry Wadsworth Longfellow*, published by Houghton Mifflin and Company in Boston and printed by the Riverside Press in Cambridge, Mass., 1887. Photo by the authors.

The Polaroid Model 95A Land Camera, introduced in 1954 as an updated version of the original instant photography system launched in 1948. Source: Collection of the authors.

Carter's Highlighting Markers were still marketed by the Avery Dennison Company in the early twenty-first century, though in a different form than in the 1960s. Photo by the authors.

Carbon Queen

The Remarkable Life of Nanoscience Pioneer Mildred Dresselhaus

Maia Weinstock

The life of trailblazing physicist Mildred Dresselhaus, who expanded our understanding of the physical world.

As a girl in New York City in the 1940s, Mildred "Millie" Dresselhaus was taught that there were only three career options open to women: secretary, nurse, or teacher. But sneaking into museums, purchasing three-cent copies of *National Geographic*, and devouring books on the history of science ignited in Dresselhaus (1930–2017) a passion for inquiry. In *Carbon Queen*, science writer Maia Weinstock describes how, with curiosity and drive, Dresselhaus defied expectations and forged a career as a pioneering scientist and engineer. Dresselhaus made highly influential discoveries about the properties of carbon and other materials and helped reshape our world in countless ways—from electronics to aviation to medicine to energy. She was also a trailblazer for women in STEM and a beloved educator, mentor, and colleague.

Her path wasn't easy. Dresselhaus's Bronx childhood was impoverished. Her graduate advisor felt educating women was a waste of time. But Dresselhaus persisted, finding mentors in Nobel Prize–winning physicists Rosalyn Yalow and Enrico Fermi. Eventually, Dresselhaus became one of the first female professors at MIT, where she would spend nearly six decades. Weinstock explores the basics of Dresselhaus's work in carbon nanoscience accessibly and engagingly, describing how she identified key properties of carbon forms, including graphite, buckyballs, nanotubes, and graphene, leading to applications that ranged from lighter, stronger aircraft to more energy-efficient and flexible electronics.

Maia Weinstock is an editor, writer, and producer of science and children's media whose work has appeared in *Scientific American*, *Discover*, SPACE.com, BrainPOP, and Scholastic's *Science World*. Deputy Editorial Director at MIT News and a lecturer at MIT on the history of women in STEM, she created LEGO's "Women of NASA."
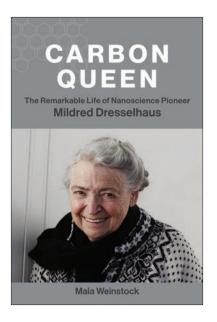
"*Carbon Queen* is a true delight: a powerful story, perfectly told, which is equal parts inspiring and informative. Weinstock's words effortlessly capture Dresselhaus's enthusiasm, tenacity, and genius. A fitting tribute to a scientific legend."

—Jess Wade, physicist, Imperial College London; author of *Nano: The Spectacular Science of the Very (Very) Small*

The Nexus

Augmented Thinking for a Complex
World—The New Convergence of Art,
Technology, and Science

Julio Mario Ottino

with Bruce Mau

**Why today's complex problems demand
a radically new way of thinking—one
in which art, technology, and science
converge.**

Today's complex problems demand a
radically new way of thinking—one in
which art, technology, and science converge
to expand our creativity and augment our
insight. Creativity must be combined with
the ability to execute; the innovators of the
future will have to understand this balance and manage
such complexities as climate change and pandemics. The
place of this convergence is the Nexus. In this provoca-
tive and visually striking book, Julio Mario Ottino and
Bruce Mau offer a guide for navigating the intersections
of art, technology, and science.

   The Nexus brings together word and image to prepare
us—individuals and organizations alike—for the chal-
lenges and opportunities of the twenty-first century.
Compelling historic examples illuminate the present,
from the Renaissance, when the domains were one, to
the twentieth century, with intense, collective creative
outpourings from places as different as the Bauhaus and
Bell Labs. Leaders must be able to grasp simplicity in
complexity and complexity in simplicity—and embrace
the powerful idea of complementarity, where opposing
extremes coexist and our thinking expands. Innovation
needs more than managing. Managers use maps; leaders
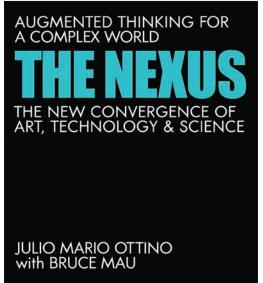develop compasses.

Julio Mario Ottino is an academic thought leader, author, artist, and
internationally recognized researcher whose work has been featured
in *Nature*, *Science*, and *Scientific American*. A Guggenheim Fellow, he
is the founding Codirector of Northwestern University's Institute on
Complex Systems. **Bruce Mau** is a designer, artist, entrepreneur, author,
and educator. He has designed and coauthored books with, among
others, Rem Koolhaas (*S,M,L,XL*). For many years, he designed all of the
books published by Zone Books, the Getty Research Institute, and the
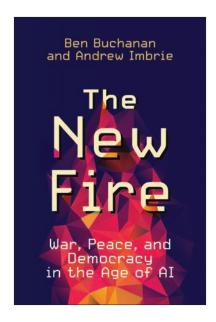Gagosian Gallery.

The New Fire

War, Peace, and Democracy in the Age of AI

Ben Buchanan and Andrew Imbrie

AI is revolutionizing the world. Here's how democracies can come out on top.

Artificial intelligence is revolutionizing the modern world. It is ubiquitous—in our homes and offices, in the present and most certainly in the future. Today, we encounter AI as our distant ancestors once encountered fire. If we manage AI well, it will become a force for good, lighting the way to many transformative inventions. If we deploy it thoughtlessly, it will advance beyond our control. If we wield it for destruction, it will fan the flames of a new kind of war, one that holds democracy in the balance. As AI policy experts Ben Buchanan and Andrew Imbrie show in *The New Fire*, few choices are more urgent—or more fascinating—than how we harness this technology and for what purpose.

The new fire has three sparks: data, algorithms, and computing power. These components fuel viral disinformation campaigns, new hacking tools, and military weapons that once seemed like science fiction. To autocrats, AI offers the prospect of centralized control at home and asymmetric advantages in combat. It is easy to assume that democracies, bound by ethical constraints and disjointed in their approach, will be unable to keep up. But such a dystopia is hardly preordained. Combining an incisive understanding of technology with shrewd geopolitical analysis, Buchanan and Imbrie show how AI can work for democracy. With the right approach, technology need not favor tyranny.

Ben Buchanan is Assistant Teaching Professor at the Georgetown University School of Foreign Service, where he is also a Senior Faculty Fellow and Director of the CyberAI Project at the Center for Security and Emerging Technology. He is the author of *The Hacker and the State* and *The Cybersecurity Dilemma*. **Andrew Imbrie** is Senior Fellow at Georgetown's Center for Security and Emerging Technology. The author of *Power on the Precipice*, he served as a member of the policy planning staff and speechwriter to Secretary John Kerry at the US Department of State and as a professional staff member on the Senate Foreign Relations Committee.

"*The New Fire* is an essential guide to the age of artificial intelligence written by two of its leading scholars. Ben Buchanan and Andrew Imbrie help the reader understand the incredible promises and daunting perils of AI, while exploring the dramatic impact it could have on geopolitics in the decades ahead."

—Madeleine Albright, former US Secretary of State

"*The New Fire* provides a brilliant, exceedingly readable examination of the impact of artificial intelligence on all imaginable endeavors from war and peace to politics. It is equal parts highly informative, wonderfully descriptive, and more than a bit terrifying!"

—General David Petraeus, US Army (Ret.), former Commander of the Surge in Iraq, US Central Command, and Coalition and US Forces in Afghanistan and former Director of the CIA

"Mixing technical depth, history, ethical philosophy, and penetrant analysis, Buchanan and Imbrie offer a comprehensive perspective on the promise and perils of machine learning and artificial intelligence."

—Vint Cerf, Internet Pioneer

Out of Touch

How to Survive an Intimacy Famine

Michelle Drouin

A behavioral scientist explores love, belongingness, and fulfillment, focusing on how modern technology can both help and hinder our need to connect.

Millions of people around the world are not getting the physical, emotional, and intellectual intimacy they crave. Through the wonders of modern technology, we are connecting with more people more often than ever before; but are these connections what we long for? Pandemic isolation has made us even more alone. In *Out of Touch*, Professor of Psychology Michelle Drouin investigates what she calls our intimacy famine, exploring love, belongingness, and fulfillment and considering why relationships carried out on technological platforms may leave us starving for physical connection. Drouin puts it this way: when most of our interactions are through social media, we are taking tiny hits of dopamine rather than the huge shots of oxytocin that an intimate in-person relationship would provide.

Drouin explains that intimacy is not just sex—although of course sex is an important part of intimacy. But how important? Drouin reports on surveys that millennials (perhaps distracted by constant Tinder-swiping) have less sex than previous generations. She discusses pandemic puppies, professional cuddlers, the importance of touch, "desire discrepancy" in marriage, and the value of friendships. Online dating, she suggests, might give users too many options; and the internet facilitates "infidelity-related behaviors." Some technological developments will help us develop and maintain intimate relationships—our phones, for example, can be bridges to emotional support. Some, on the other hand, might leave us out of touch. Drouin explores both of these possibilities.

Michelle Drouin is a behavioral scientist and expert on technology, relationships, couples, and sexuality whose work has been featured or cited in the *New York Times*, CBS News, CNN, NPR, and other media outlets. She is Professor of Psychology at Purdue University–Fort Wayne and Senior Research Scientist at the Parkview Mirro Center for Research and Innovation.

Power On!

Jean J. Ryoo and Jane Margolis

illustrated by Charis JB

A diverse group of teenage friends learn how computing can be personally and politically empowering and why all students need access to computer science education.

This lively graphic novel follows a diverse group of teenage friends as they discover that computing can be fun, creative, and empowering. Taylor, Christine, Antonio, and Jon seem like typical young teens—they communicate via endless texting, they share jokes, they worry about starting high school, and they have each other's backs. But when a Black man is shot and killed by police in their city, they are outraged—and then they learn that he had been misidentified and tracked by an artificial intelligence program. How can an algorithm be racist? And what is an algorithm, anyway?

In school, they decide to explore computing classes, with mixed results. One class is only about typing. The class that Christine wants to join is full, and the school counselor suggests that she take a class in "Tourism and Hospitality" instead. (Really??) But Antonio's class seems legit, Christine finds an after-school program, and they decide to teach the others what they learn. By summer vacation, all four have discovered that computing is both personally and politically empowering.

Interspersed through the narrative are text boxes with computer science explainers and inspirational profiles of people of color and women in the field (including Katherine Johnson of *Hidden Figures* fame). *Power On!* is an essential read for young adults, general readers, educators, and anyone interested in the power of computing, how computing can do good or cause harm, and why addressing underrepresentation in computing needs to be a top priority.

young adult fiction | graphic novels

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Jean J. Ryoo (she/her) is an avid reader of manga and manhwa, as well as an educational researcher/writer committed to ensuring all students experience meaningful and empowering learning, both in and out of school. **Jane Margolis** is a UCLA educational researcher and author who has been a longtime advocate for ending inequality and segregation in computer science education, for which she won the 2016 White House Champion of Change award. **Charis JB** (she/her) is a Black-biracial Latinx artist whose work often centers around issues related to race and gender equality, sexual identity, class, and more.
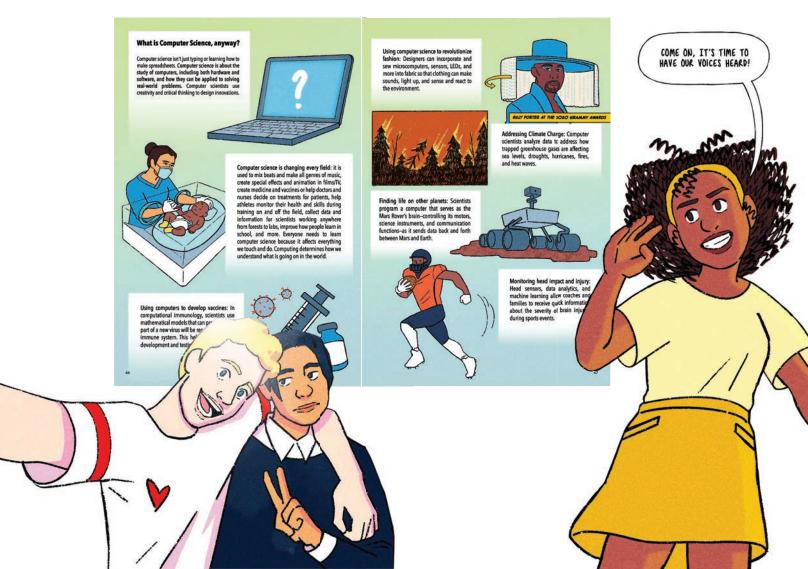
What is Computer Science, anyway?

Computer science isn't just typing or learning how to make spreadsheets. Computer science is about the study of computers, including both hardware and software, and how they can be applied to solving real-world problems. Computer scientists use creativity and critical thinking to design innovations.

Computer science is changing every field: it is used to mix beats and make all genres of music, create special effects and animation in films/TV, create medicine and vaccines or help doctors and nurses decide on treatments for patients, help athletes monitor their health and skills during training on and off the field, collect data and information for scientists working anywhere from forests to labs, improve how people learn in school, and more. Everyone needs to learn computer science because it affects everything we touch and do. Computing determines how we understand what is going on in the world.

Using computers to develop vaccines: In computational immunology, scientists use mathematical models that can pr[e]... part of a new virus will be re... immune system. This hel... development and testi...

Using computer science to revolutionize fashion: Designers can incorporate and sew microcomputers, sensors, LEDs, and more into fabric so that clothing can make sounds, light up, and sense and react to the environment.

BILLY PORTER AT THE 2020 GRAMMY AWARDS

Addressing Climate Change: Computer scientists analyze data to address how trapped greenhouse gases are affecting sea levels, droughts, hurricanes, fires, and heat waves.

Finding life on other planets: Scientists program a computer that serves as the Mars Rover's brain—controlling its motors, science instruments, and communication functions—as it sends data back and forth between Mars and Earth.

Monitoring head impact and injury: Head sensors, data analytics, and machine learning allow coaches and families to receive quick information about the severity of brain injur[y] during sports events.

The Intermittent Fasting Revolution

The Science of Optimizing Health and Enhancing Performance

Mark P. Mattson

How intermittent fasting can enhance resilience, improve mental and physical performance, and protect against aging and disease.

Most of us eat three meals a day with a smattering of snacks because we think that's the normal, healthy way to eat. This book shows why that's not the case. The human body and brain evolved to function well in environments where food could be obtained only intermittently. When we look at the eating patterns of our distant ancestors, we can see that an intermittent fasting eating pattern is normal—and eating three meals a day is not. In *The Intermittent Fasting Revolution*, prominent neuroscientist Mark Mattson shows that intermittent fasting is not only normal but also good for us; it can enhance our ability to cope with stress by making cells more resilient. It also improves mental and physical performance and protects against aging and disease.

Intermittent fasting is not the latest fad diet; it doesn't dictate food choice or quantity. It doesn't make money for the pharmaceutical, processed food, or health care industries. Intermittent fasting is an eating pattern that includes frequent periods of time with little or negligible amounts of food. It is often accompanied by weight loss, but, Mattson says, studies show that its remarkable beneficial effects cannot be accounted for by weight loss alone.

Mattson—whose pioneering research uncovered the ways that the brain responds to fasting and exercise—explains how thriving while fasting became an evolutionary adaptation. He describes the specific ways that intermittent fasting slows aging; reduces the risk of diseases, including obesity, Alzheimer's, and diabetes; and improves both brain and body performance. He also offers practical advice on adopting an intermittent fasting eating pattern as well as information for parents and physicians.

Mark P. Mattson, currently Adjunct Professor of Neuroscience at Johns Hopkins University, was previously Chief of the Laboratory of Neurosciences at the National Institute on Aging in Baltimore.

"An excellent book, full of very valuable information to improve health and longevity from one of the pioneers and leaders of the 'intermittent fasting revolution.'"

—Valter D. Longo, Director of the University of Southern California Longevity Institute, author of the international bestseller *The Longevity Diet*

"This timely book, which includes both historical antecedents as well as the very latest research, is an authoritative and yet accessible introduction to intermittent fasting. Dr. Mattson has done more than any other scientist to illuminate this critically important topic and we are fortunate to have this succinct synopsis of decades of research."

—Ken Ford, Founder and Director, Institute for Human and Machine Cognition

The Parent Trap

How to Stop Overloading Parents and Fix Our Inequality Crisis

Nate G. Hilger

How parents have been set up to fail, and why helping them succeed is the key to achieving a fair and prosperous society.

Few people realize that raising children is the single largest industry in the United States. Yet this vital work receives little political support, and its primary workers—parents—labor in isolation. If they ask for help, they are made to feel inadequate; there is no centralized organization to represent their interests; and there is virtually nothing spent on research and development to help them achieve their goals. It's almost as if parents are set up to fail—and the result is lost opportunities that limit children's success and make us all worse off. In *The Parent Trap*, Nate Hilger combines cutting-edge social science research, revealing historical case studies, and on-the-ground investigation to recast parenting as the hidden crucible of inequality.

Parents are expected not only to care for their children but to help them develop the skills they will need to thrive in today's socioeconomic reality—but most parents, including even the most caring parents on the planet, are not trained in skill development and lack the resources to get help. How do we fix this? The solution, Hilger argues, is to ask less of parents, not more. America should consider child development a public investment with a monumental payoff. We need programs inspired by Medicare—call them Familycare—to drive this investment. To make it happen, parents need to become an interest group that can wield its political power on behalf of children—who will always be the largest bloc of disenfranchised people in this country.

The Parent Trap exposes the true costs of our society's unrealistic expectations around parenting and lays out a profoundly hopeful blueprint for reform.
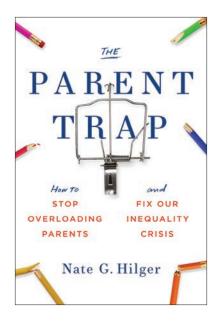
Nate G. Hilger is an economist and data scientist in Silicon Valley. His work on the origins of success in children has been featured in the *New York Times*, the *Washington Post*, and other media outlets.

current affairs | politics

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An Infinity of Worlds

Cosmic Inflation and the Beginning of the Universe

Will Kinney

What happened before the primordial fire of the Big Bang: a theory about the ultimate origin of the universe.

In the beginning was the Big Bang: an unimaginably hot fire almost fourteen billion years ago in which the first elements were forged. The physical theory of the hot nascent universe—the Big Bang—was one of the most consequential developments in twentieth-century science. And yet it leaves many questions unanswered: Why is the universe so big? Why is it so old? What is the origin of structure in the cosmos? In *An Infinity of Worlds*, physicist Will Kinney explains a more recent theory that may hold the answers to these questions and even explain the ultimate origins of the universe: cosmic inflation, before the primordial fire of the Big Bang.

Kinney argues that cosmic inflation is a transformational idea in cosmology, changing our picture of the basic structure of the cosmos and raising unavoidable questions about what we mean by a scientific theory. He explains that inflation is a remarkable unification of inner space and outer space, in which the physics of the very large (the cosmos) meets the physics of the very small (elementary particles and fields), closing in a full circle at the first moment of time. With quantum uncertainty its fundamental feature, this new picture of cosmic origins introduces the possibility that the origin of the universe was of a quantum nature.

Kinney considers the consequences of eternal cosmic inflation. Can we come to terms with the possibility that our entire observable universe is one of infinitely many, forever hidden from our view?

Will Kinney is Professor in the Department of Physics at the University at Buffalo, the State University of New York.
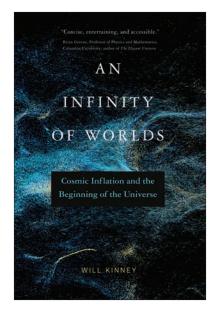
"In concise, entertaining and accessible language, *An Infinity of Worlds* ushers readers to the forefront of cosmology. Will Kinney takes on some of the most controversial issues of current research, and treats them with uncommon subtlety and nuance. An excellent read."

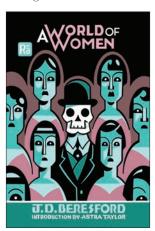**—Brian Greene, Professor of Physics and Mathematics, Columbia University; author of *The Elegant Universe***

A World of Women

J. D. Beresford

introduction by Astra Taylor

When a plague wipes out most of the world's male population and civilization crumbles, women struggle to build an agrarian community in the English countryside.

Imagine a plague that brings society to a standstill by killing off most of the men on Earth. The few men who survive descend into lechery and atavism. Meanwhile, a group of women (accompanied by one virtuous male survivor) leave the wreckage of London to start fresh, establishing a communally run agrarian outpost. But their sexist society hasn't permitted most of them to learn any useful skills—will the commune survive their first winter? This is the bleak world imagined in 1913 by English writer J. D. Beresford—one that has particular resonance for the planet's residents in the 2020s. This edition of *A World of Women* offers twenty-first century readers a new look at a neglected classic.

Beresford introduces us to the solidly bourgeois, prim and proper, Gosling family. As once-bustling London shuts down—Parliament closes, factories grind to a halt, nature reclaims stone and steel—the paterfamilias Mr. Gosling adopts a life of libertinism while his daughters in the countryside struggle to achieve a radically transformed and improved, egalitarian and feminist future.

J. D. Beresford (1873–1947) was a British writer of science fiction and horror. His novel *The Hampdenshire Wonder* was much influenced by H. G. Wells, and in 1914 Beresford published the first critical study of Wells.

science fiction

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Radium Age series

Radium Age Series

Under the direction of Joshua Glenn, the MIT Press's Radium Age is reissuing notable proto-science fiction stories from the underappreciated era between 1900 and 1935, with new contributions by historians, science journalists, and science fiction authors.

The World Set Free

H. G. Wells

introduction by Sarah Cole

afterword by Joshua Glenn

In a novel written on the eve of World War I, H. G. Wells imagines a war "to end all wars" that begins in atomic apocalypse but ends in an enlightened utopia.

Writing in 1913, on the eve of World War I's mass slaughter and long before World War II's mushroom cloud finale, H. G. Wells imagined a war that begins in atomic apocalypse but ends in a utopia of enlightened world government. Set in the 1950s, Wells's neglected novel *The World Set Free* describes a conflict so horrific that it actually is the war that ends war.

Wells—the first to imagine a "uranium-based bomb"—offers a prescient description of atomic warfare that renders cities unlivable for years: "Whole blocks of buildings were alight and burning fiercely, the trembling, ragged flames looking pale and ghastly and attenuated in comparison with the full-bodied crimson glare beyond." Drawing on discoveries by physicists and chemists of the time, Wells foresees both a world powered by clean, plentiful atomic energy—and the destructive force of the neutron chain reaction.

With a cast of characters including Marcus Karenin, the moral center of the narrative; Firmin, a proto-Brexiteer; and Egbert, the visionary young British monarch, Wells dramatizes a world struggling for sanity. Wells's supposedly happy ending—a planetary government presided over by European men—may not appeal to contemporary readers, but his anguish at the world's self-destructive tendencies will strike a chord.

H. G. Wells (1866–1946) was a prolific and best-selling author of novels, short stories, and social commentary. Among his best-known works are *The Time Machine*, *The Invisible Man*, *The War of the Worlds*, and *The Island of Doctor Moreau*.

science fiction

May | 5 1/4 x 7 3/4, 282 pp.

US $19.95T/$25.95 CAN paper
978-0-262-54336-1

Radium Age series

The Clockwork Man

E. V. Odle

introduction by Annalee Newitz

In the first-ever novel about a cyborg, a machine-enhanced man from a multiverse of the far future visits 1920s England.

In 1920s England, a strange being crashes a village cricket game. After some glitchy, jerky attempts to communicate, this creature reveals that he is a machine-enhanced human from a multiverse thousands of years in the future. The mechanism implanted in his skull has malfunctioned, sending him tumbling through time onto the green grass of the cricket field. Apparently in the future, at the behest of fed-up women, all men will be controlled by an embedded "clockwork," camouflaged with hats and wigs. Published in 1923, *The Clockwork Man*—the first cyborg novel—tells the story of this odd time traveler's visit.

Spending time with two village couples about to embark upon married life, the Clockwork Man warns that because men of the twentieth century are so violent, sexist, and selfish, in the not-too-distant future they will be banned from physical reality. They will inhabit instead a virtual world—what we'd now call the Singularity—in which their every need is met, but love is absent. Will the Clockwork Man's tale lead his new friends to reconsider technology, gender roles, sex, and free will?

Overshadowed in its own time by Karel Čapek's sensational 1923 play *R.U.R.*, about a robot uprising, *The Clockwork Man* is overdue for rediscovery.

E. V. Odle (1890–1942) was a Bloomsbury-adjacent magazine editor in London.

"Edwin Vincent Odle's ominous, droll, and unforgettable *The Clockwork Man* is a missing link between Lewis Carroll and John Sladek or Philip K. Dick."

—Jonathan Lethem, author of *The Arrest*

Voices from the Radium Age

edited and introduced by Joshua Glenn

A collection of science fiction stories from the early twentieth century by authors ranging from Arthur Conan Doyle to W. E. B. Du Bois.

This collection of science fiction stories from the early twentieth century features work by the famous (Arthur Conan Doyle, creator of Sherlock Holmes), the no-longer famous ("weird fiction pioneer" William Hope Hodgson), and the should-be-more famous (Bengali feminist Rokeya Sakhawat Hossain). It offers stories by writers known for concerns other than science fiction (W. E. B. Du Bois, author of *The Souls of Black Folk*) and by writers known only for pulp science fiction (the prolific Neil R. Jones). These stories represent what volume and series editor Joshua Glenn has dubbed "the Radium Age"—the period when science fiction as we know it emerged as a genre. The collection shows that nascent science fiction from this era was prescient, provocative, and well written.

Readers will discover, among other delights, a feminist utopia predating Charlotte Perkins Gilman's *Herland* by a decade in Hossain's story, "Sultana's Dream"; a world in which the human population has retreated underground, in E. M. Forster's "The Machine Stops"; an early entry in the Afrofuturist subgenre in Du Bois's last-man-on-Earth tale, "The Comet"; and the first appearance of Jones's cryopreserved Professor Jameson, who despairs at Earth's wreckage but perseveres—in a metal body—to appear in thirty-odd more stories.

Joshua Glenn, writer and semiotician, is the editor of the Radium Age series and the publisher of HiLobrow. He is the coauthor several books, including *The Idler's Glossary* and *Unbored: The Essential Field Guide to Serious Fun*.
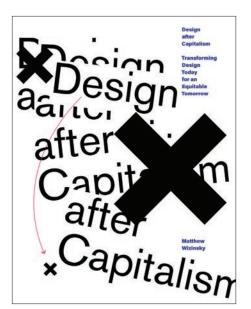
Design after Capitalism

Transforming Design Today for an Equitable Tomorrow

Matthew Wizinsky

How design can transcend the logics, structures, and subjectivities of capitalism: a framework, theoretical grounding, and practical principles.

The designed things, experiences, and symbols that we use to perceive, understand, and perform our everyday lives are much more than just props. They directly shape how we live. In *Design after Capitalism*, Matthew Wizinsky argues that the world of industrial capitalism that gave birth to modern design has been dramatically transformed. Design today needs to reorient itself toward deliberate transitions of everyday politics, social relations, and economies. Looking at design through the lens of political economy, Wizinsky calls for the field to transcend the logics, structures, and subjectivities of capitalism—to combine design entrepreneurship with social empowerment in order to facilitate new ways of producing those things, symbols, and experiences that make up everyday life.

After analyzing the parallel histories of capitalism and design, Wizinsky offers some historical examples of anticapitalist, noncapitalist, and postcapitalist models of design practice. These range from the British Arts and Crafts movement of the nineteenth century to contemporary practices of growing furniture or biotextiles and automated forms of production. Drawing on insights from sociology, philosophy, economics, political science, history, environmental and sustainability studies, and critical theory—fields not usually seen as central to design—he lays out core principles for postcapitalist design; offers strategies for applying these principles to the three layers of project, practice, and discipline; and provides a set of practical guidelines for designers to use as a starting point. The work of postcapitalist design can start today, Wizinsky says—with the next project.

Matthew Wizinsky, a designer with more than twenty years of professional experience, is Associate Professor in the Ullman School of Design at the University of Cincinnati and Associate Editor for the design journal *Visible Language*.

"Matthew Wizinksy shows designers how to erode capitalism from the inside out by nurturing the commons and creating tools for cooperation and exchange. Above all, designers can help us downsize everything from packaging and waste to the ever-expanding work week of the creative classes."

—Ellen Lupton, coauthor of *Extra Bold: A Feminist, Inclusive, Anti-Racist, Nonbinary Field Guide for Graphic Designers*

"An essential examination of the potential for design and designers to contribute to societal transitions toward more sustainable, equitable, and desirable long-term futures."

—Terry Irwin, Director of the Transition Design Institute, Carnegie Mellon University

Reimagining Design

Unlocking Strategic Innovation

Kevin G. Bethune

foreword by John Maeda

The power of transformative design, multidisciplinary leaps, and diversity: lessons from a Black professional's journey through corporate America.

Design offers so much more than an aesthetically pleasing logo or banner, a beautification add-on after the heavy lifting. In *Reimagining Design*, Kevin Bethune shows how design provides a unique angle on problem-solving—how it can be leveraged strategically to cultivate innovation and anchor multidisciplinary teamwork. As he does so, he describes his journey as a Black professional through corporate America, revealing the power of transformative design, multidisciplinary leaps, and diversity. Bethune, who began as an engineer at Westinghouse, moved on to Nike (where he designed Air Jordans), and now works as a sought-after consultant on design and innovation, shows how design can transform both individual lives and organizations.

In Bethune's account, diversity, equity, and inclusion emerge as a recurring theme. He shows how, as we leverage design for innovation, we also need to consider the broader ecological implications of our decisions and acknowledge the threads of systemic injustice in order to realize positive change. His book is for anyone who has felt like the "other"—and also for allies who want to encourage anti-racist, anti-sexist and anti-ageist behaviors in the workplace. Design transformation takes leadership—leaders who do not act as gatekeepers but, with agility and nimbleness, build teams that mirror the marketplace.

Design in harmony with other disciplines can be incredibly powerful; multidisciplinary team collaboration is the foundation of future innovation. With insight and compassion, Bethune provides a framework for bringing this about.

Kevin G. Bethune is the Founder and Chief Creative Officer of dreams • design + life, a think tank for design and innovation. Over a career that spans more than twenty years, he has worked in engineering, business, and design.
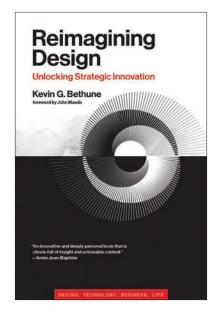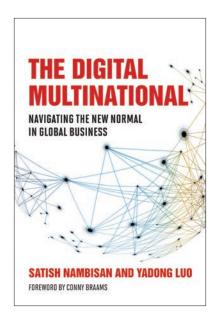
"An innovative and deeply personal book that is chock full of insight and actionable content. Bethune's emphasis on 'strategic' design thinking, combined with his ability to balance his corporate and engineering knowledge with design, will unlock value for many readers, from new grads to the C-suite."

—Annie Jean-Baptiste, author of *Building for Everyone*; founder, Equity Army

"With vulnerability, clarity, and actionable insights, Kevin Bethune answers important questions for increasing diversity and inclusion in design: What does it mean to be a Black man succeeding in design? What can you learn from him to help others succeed?"

—Dori Tunstall, Dean of Design, OCAD University

The Digital Multinational

Navigating the New Normal in Global Business

Satish Nambisan and Yadong Luo

foreword by Conny Braams, Chief Digital and Marketing Officer at Unilever

How multinational companies can use digital technology to compete in a world where business is driven by the forces of both globalization and deglobalization.

Digital technology has put globalization on steroids; multinational companies now account for one-third of world GDP and one-fourth of world employment. And yet complicating this story of unchecked global capitalism are two contradictory forces. Even as advances in digital technology enable borderless markets, a new nationalism has emerged, reviving protectionism and railing against digital colonialism. In *The Digital Multinational*, management experts Satish Nambisan and Yadong Luo examine how companies can adopt a dual strategy to cope with this new normal: harnessing the power of digital technology while adapting to the geopolitical realities of particular markets.

Key to success, Nambisan and Luo explain, is the notion of tight and loose coupling to characterize the relationship of the digital multinational to its global partners and subsidiaries. Identifying the tightness-looseness requirements of global business connectivity leads to successful business strategy. Drawing on real-world examples that include Burberry's entrance into the Chinese market, Unilever's AI-powered global talent marketplace, and the Vocal for Local movement in India, they develop a typology of global business contexts; discuss digital strategies for entering new markets, establishing digital platforms, managing globally dispersed activities, and pursuing innovation; and explain how these strategies can be part of a business leader's toolkit.

Satish Nambisan, a globally recognized authority on innovation and digital strategy, is Nancy and Joseph Keithley Professor of Technology Management at the Weatherhead School of Management at Case Western Reserve University. He is the author of *The Global Brain: Your Roadmap for Innovating Faster and Smarter in a Networked World* and other books. **Yadong Luo** is Emery M. Findley Distinguished Chair and Professor of Management at the University of Miami. He is the author of *Global Dimensions of Corporate Governance* and other books.

business | management

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Management on the Cutting Edge series, published in cooperation with *MIT Sloan Management Review*

"There is no doubt digital is changing our lives. And yet, just when we thought we'd seen it all, during the pandemic we saw an even faster pace of transformation across all walks of life. I highly recommend this insightful book to leaders across the globe as they navigate the new normal."

—Harit Talwar, Chairman of Consumer Business, Goldman Sachs

Work without Jobs

How to Reboot Your Organization's Work
Operating System

Ravin Jesuthasan and John W. Boudreau

**Why the future of work requires the
deconstruction of jobs and the reconstruction
of work.**

Work is traditionally understood as a "job," and workers
as "jobholders." Jobs are structured by titles, hierarchies,
and qualifications. In *Work without Jobs*, Ravin Jesuthasan
and John Boudreau propose a radically new way of
looking at work. They describe a new "work operating
system" that deconstructs jobs into their component
parts and reconstructs these components into more
optimal combinations that reflect the skills and abilities
of individual workers. In a new normal of rapidly
accelerating automation, demands for organizational
agility, efforts to increase diversity, and the emergence
of alternative work arrangements, the old system based
on jobs and jobholders is cumbersome and ungainly.
Jesuthasan and Boudreau's new system lays out a
roadmap for the future of work.

Work without Jobs presents real-world cases that show
how leading organizations are embracing work decon-
struction and reinvention. For example, when a robot,
chatbot, or artificial intelligence takes over parts of a job
while a human worker continues to do other parts, what
is the "job"? DHL found some answers when it deployed
social robotics at its distribution centers. Meanwhile, the
biotechnology company Genentech deconstructed jobs
to increase flexibility, worker engagement, and retention.
Other organizations achieved agility with internal talent
marketplaces, worker exchanges, freelancers, crowd-
sourcing, and partnerships. It's time for organizations to
reboot their work operating system, and *Work without Jobs*
offers an essential guide for doing so.

Ravin Jesuthasan, a recognized futurist and authority on the future
of work, human capital, and automation, is Senior Partner and Global
Leader for Transformation Services at Mercer. He is a member of the
World Economic Forum's steering committee on work and employment.
John W. Boudreau conducts breakthrough research on human
capital, talent, and sustainable competitive advantage. He is Emeritus
Professor of Management and Organization at the University of Southern
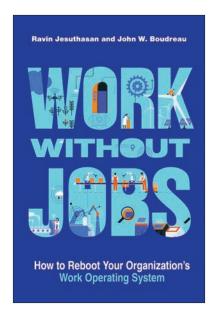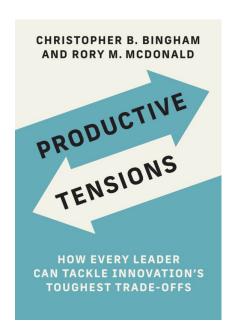California's Marshall School of Business.

Productive Tensions

How Every Leader Can Tackle Innovation's
Toughest Trade-Offs

Christopher B. Bingham and Rory M. McDonald

**How leaders can recast innovation's toughest
trade-offs—efficiency vs. flexibility, consistency
vs. change, product vs purpose—as productive
tensions.**

Why is leading innovation in today's dynamic business
environment so distressingly hit-or-miss? More than
90 percent of high-potential ventures don't reach their
projected targets. Surveys show that 80 percent of execu-
tives consider innovation crucial to their growth strategy,
but only 6 percent are satisfied with their innovation
performance. Should leaders aim for Steve-Jobs-level
genius, or shower their projects with resources, or lean in
to luck and embrace uncertainty? None of the above, say
Chris Bingham and Rory McDonald.

Drawing on cutting-edge research and probing
interviews with hundreds of leaders across three conti-
nents, in *Productive Tensions* Bingham and McDonald find
that the most effective leaders and successful innovators
embrace the tensions that arise from competing aims:
efficiency or flexibility? consistency or change? product
or purpose? Bingham and McDonald spotlight eight
critical tensions that every innovator must master, and
they spell out, with dozens of detailed examples of both
success and failure, how to navigate them. How do you
excite customers about a product they've never imag-
ined? When is it wise to accept what the data is telling
you, and when should you ignore the data and plow
forward anyway? How can you maintain stakeholders'
trust and support during radical unforeseen course
corrections? Bingham and McDonald guide readers
through innovation's thorniest tensions, using examples
drawn from the experience of organizations as varied
as P&G, Instagram, the US military, Honda, In-N-Out
Burger, Slack, Under Armour, and the snowboarding
company Burton.

Christopher B. Bingham is Philip Hettleman Distinguished Scholar and
Professor and Area Chair of Strategy and Entrepreneurship at Kenan-
Flagler Business School at the University of North Carolina–Chapel Hill.
Rory M. McDonald is Thai-Hi T. Lee Associate Professor of Business
Administration at Harvard Business School.

Inclusion on Purpose

An Intersectional Approach to Creating a Culture of
Belonging at Work

Ruchika Tulshyan

foreword by Ijeoma Oluo

**How organizations can foster diversity, equity, and
inclusion: taking action to address and prevent
workplace bias while centering women of color.**

Few would disagree that inclusion is both the right thing
to do and good for business. Then why are we so terrible
at it? If we believe in the morality and the profitability of
including people of diverse and underestimated back-
grounds in the workplace, why don't we do it? Because,
explains Ruchika Tulshyan in this eye-opening book, we
don't realize that inclusion takes awareness, intention,
and regular practice. Inclusion doesn't just happen;
we have to work at it. Tulshyan presents inclusion best
practices, showing how leaders and organizations can
meaningfully promote inclusion and diversity.

Tulshyan centers the workplace experience of women
of color, who are subject to both gender and racial
bias. It is at the intersection of gender and race, she
shows, that we discover the kind of inclusion policies
that benefit all. Tulshyan debunks the idea of the "level
playing field" and explains how leaders and organiza-
tions can use their privilege for good by identifying
and exposing bias, knowing that they typically have
less to lose in speaking up than a woman of color does.
She explains why "leaning in" doesn't work—and
dismantling structural bias does; warns against hiring
for "culture fit," arguing for "culture add" instead; and
emphasizes the importance of psychological safety in the
workplace—you need to know that your organization
has your back. With this important book, Tulshyan
shows us how we can make progress toward inclusion
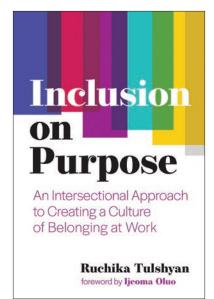and diversity—and we must start now.

Ruchika Tulshyan, an award-winning inclusion strategist and speaker,
is CEO and founder of Candour, which works with organizations to
create diverse teams and inclusive cultures. A former business journalist,
she has reported from four countries and writes regularly on inclusive
leadership for the *Harvard Business Review*. She was named to the
Thinkers50 list, a global ranking described by the *Financial Times* as "the
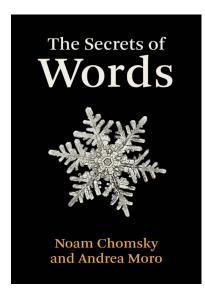Oscars of management thinking."

business | management

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"As a woman of color and an execu-
tive, I know first-hand how impor-
tant it is for companies to create
opportunities for women of color to
lead. *Inclusion on Purpose* shows
how to build an inclusive workplace
and culture through storytelling
and practical frameworks. Whether
you are a manager or you want to
become one, this book is essential
reading!"

**—Reema Batnagar, VP People,
Pixar Animation Studios**

The Secrets of Words

Noam Chomsky and Andrea Moro

Two distinguished linguists on language, the history of science, misplaced euphoria, surprising facts, and potentially permanent mysteries.

In *The Secrets of Words*, influential linguist Noam Chomsky and his longtime colleague Andrea Moro have a wide-ranging conversation, touching on such topics as language and linguistics, the history of science, and the relation between language and the brain. Moro draws Chomsky out on today's misplaced euphoria about artificial intelligence (Chomsky sees "lots of hype and propaganda" coming from Silicon Valley), the study of the brain (Chomsky points out that findings from brain studies in the 1950s never made it into that era's psychology), and language acquisition by children. Chomsky in turn invites Moro to describe his own experiments on language and the brain, and Moro does so, drawing a distinction between *where* questions (where in the brain language happens) and *what* questions (what actual information is passed from one neuron to another).

Chomsky once said, "It is important to learn to be surprised by simple facts"—"an expression of yours that has represented a fundamental turning point in my own personal life," says Moro—and this is something of a theme in their conversation. Another theme is that not everything can be known; there may be permanent mysteries, about language and other matters. Not all words will give up their secrets.
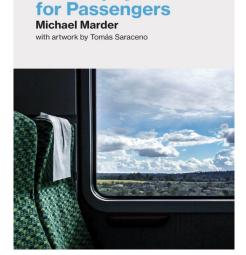
Noam Chomsky is Institute Professor and Professor of Linguistics Emeritus at MIT and Laureate Professor in the Department of Linguistics at the University of Arizona, where he is also the Agnese Nelms Haury Chair in the Agnese Nelms Haury Program in Environment and Social Justice. He is the author of many influential books on linguistics, including *Aspects of the Theory of Syntax* and *The Minimalist Program*, both published by the MIT Press. **Andrea Moro** is Professor of General Linguistics at the Institute for Advanced Study (IUSS) in Pavia, Italy. He is the author of *Impossible Languages*, *The Boundaries of Babel*, and *A Brief History of the Verb To Be* (all published by the MIT Press), and other books.

Philosophy for Passengers

Michael Marder

illustrations by Tomás Saraceno

A philosophical guide to passengerhood, with reflections on time, space, existence, boredom, our sense of self, and our sense of the senses.

While there are entire bookstore sections—and even entire bookstores—devoted to travel, there have been few books on the universal experience of being a passenger. With this book, philosopher Michael Marder fills the gap, offering a philosophical guide to passengerhood. He takes readers from ticketing and preboarding (preface and introduction) through a series of stops and detours (reflections on topics including time, space, existence, boredom, our sense of self, and our sense of the senses) to destination and disembarking (conclusion).
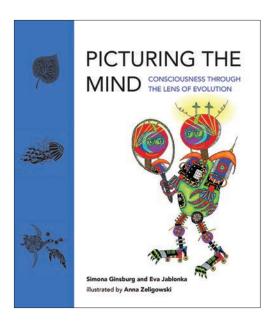
Marder finds that the experience of passengers in the twenty-first century is experience itself, stretching well beyond railroad tracks and airplane flight patterns. On his journey through passengerhood, he considers, among many other things, passenger togetherness, which goes hand in hand with passenger loneliness; flyover country and the idea of placeness; and Descartes in an airplane seat. He tells us that the word *metaphor* means *transport* in Greek and discusses the gray area between literalness and metaphoricity; explains the connection between reading and riding; and ponders the difference between destination and destiny. Finally, a Beckettian disembarking: you might not be able to disembark, yet you must disembark. After the voyage in the world ends, the journey of understanding begins.

Michael Marder is Ikerbasque Research Professor in the Department of Philosophy at the University of the Basque Country (UPV-EHU). He is the author of *The Philosopher's Plant: An Intellectual Herbarium*; *Dump Philosophy: A Phenomenology of Devastation*; and other books.

French and Spanish language rights not available.

Picturing the Mind

Consciousness through the Lens
of Evolution

Simona Ginsburg and Eva Jablonka

illustrated by Anna Zeligowski

**Consciousness in all its possible
human and nonhuman varieties,
explored through words and images.**

What is consciousness, and who (or what) is conscious—humans, nonhumans, nonliving beings? How did consciousness evolve? *Picturing the Mind* pursues these questions through a series of "vistas"—short, engaging texts by Simona Ginsburg and Eva Jablonka, accompanied by Anna Zeligowski's lively illustrations.

Taking an evolutionary perspective, Ginsburg and Jablonka suggest that consciousness can take many forms and is found not only in humans but even in such animals as octopuses (who seem to express emotions by changing color) and bees (who socialize with other bees). They identify the possible evolutionary marker of the transition from nonconscious to conscious animals, and they speculate intriguingly about aliens and artificial intelligence.

Each picture and text serves as a starting point for discussion. The authors consider, among other things, what it's like to be a bat (and then later, what it's like to be a bat in virtual reality); ask if the self is like a hole in a doughnut; report that women, children, and nonwhite men were once thought by white men to be less richly conscious; and explore what sets humans apart—is it music, toolmaking, cooperative parenting, blushing, sentience, symbolic language? In *Picturing the Mind*, questions suggest answers.

Simona Ginsburg is Associate Professor at the Open University of Israel, where she developed and headed the MA Program in Biological Thought. **Eva Jablonka** is Professor at the Cohn Institute for the History and Philosophy of Science and Ideas at Tel-Aviv University. Ginsburg and Jablonka are coauthors of *The Evolution of the Sensitive Soul: Learning and the Origins of Consciousness* (MIT Press). **Anna Zeligowski** is an artist and physician. Her illustrations have appeared in numerous books and articles on scientific subjects.

psychology

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"Two of the central voices of evolutionary consciousness science present a remarkable work about the mind and its embodiments. Clear exposition of deep concepts, many new ideas, and incredible artwork will move readers on many levels. Most highly recommended."

—Michael Levin, Distinguished Professor and Vannevar Bush Chair, Department of Biology, and Director of the Allen Discovery Center, Tufts University

Machines like Us

Toward AI with Common Sense

Ronald J. Brachman and Hector J. Levesque

How we can create artificial intelligence with broad, robust common sense rather than narrow, specialized expertise.

It's sometime in the not-so-distant future, and you send your fully autonomous self-driving car to the store to pick up your grocery order. The car is endowed with as much capability as an artificial intelligence agent can have, programmed to drive better than you do. But when the car encounters a traffic light stuck on red, it just sits there—indefinitely. Its obstacle-avoidance, lane-following, and route-calculation capacities are all irrelevant; it fails to act because it lacks the common sense of a human driver, who would quickly figure out what's happening and find a workaround. In *Machines like Us*, Ron Brachman and Hector Levesque—both leading experts in AI—consider what it would take to create machines with common sense rather than just the specialized expertise of today's AI systems.
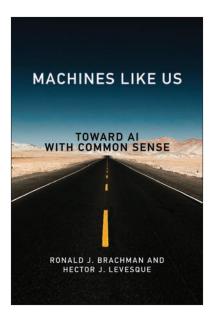
Using the stuck traffic light and other relatable examples, Brachman and Levesque offer an accessible account of how common sense might be built into a machine. They analyze common sense in humans, explain how AI over the years has focused mainly on expertise, and suggest ways to endow an AI system with both common sense and effective reasoning. Finally, they consider the critical issue of how we can trust an autonomous machine to make decisions, identifying two fundamental requirements for trustworthy autonomous AI systems: having reasons for doing what they do, and being able to accept advice. Both in the end are dependent on having common sense.
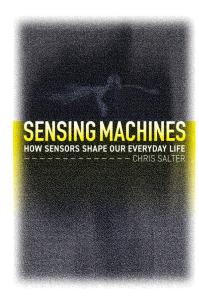
Ron Brachman is Director of the Jacobs Technion-Cornell Institute at Cornell Tech in New York City and Professor of Computer Science at Cornell University. During a long career in industry, he held leadership positions at Bell Labs, Yahoo, and DARPA. **Hector Levesque** is Professor Emeritus in the Department of Computer Science at the University of Toronto. He is the author of *Common Sense, the Turing Test, and the Quest for Real AI* (MIT Press), and other books.

Sensing Machines

How Sensors Shape Our Everyday Life

Chris Salter

How we are tracked, surveilled, tantalized, and seduced by machines ranging from smart watches and Roombas to immersive art installations.

Sensing machines are everywhere in our world. As we move through the day, electronic sensors and computers adjust our thermostats, guide our Roombas, count our steps, change the orientation of an image when we rotate our phones. There are more of these electronic devices in the world than there are people—in 2020, thirty to fifty billion of them (versus 7.8 billion people), with more than a trillion expected in the next decade. In *Sensing Machi*nes, Chris Salter examines how we are tracked, surveilled, tantalized, and seduced by machines ranging from smart watches and mood trackers to massive immersive art installations.

Salter, an artist/scholar who has worked with sensors and computers for more than twenty years, explains that the quantification of bodies, senses, and experience did not begin with the surveillance capitalism practiced by Facebook, Amazon, Netflix, and Google but can be traced back to mathematical and statistical techniques of the nineteenth century. He describes the emergence of the "sensed self," investigating how sensor technology has been deployed in music and gaming, programmable and immersive art environments, driving, and even eating, with e-tongues and e-noses that can taste and smell for us. Sensing technology turns our experience into data; but Salter's story isn't just about what these machines want from us, but what we want from them— new sensations, the thrill of the uncanny, and magic that will transport us from our daily grind.

Chris Salter is an artist, Professor of Design and Computation Arts at Concordia University, and Codirector of the Hexagram network for arts, culture, and technology. He is the author of *Entangled: Technology and the Transformation of Performance* and *Alien Agency: Experimental Encounters with Art in the Making*, both published by the MIT Press.

Inequality

A Genetic History

Carles Lalueza-Fox

How genomics reveals deep histories of inequality, going back many thousands of years.

Inequality is an urgent global concern, with pundits, politicians, academics, and best-selling books taking up its causes and consequences. In *Inequality*, Carles Lalueza-Fox offers an entirely new perspective on the subject, examining the genetic marks left by inequality on humans throughout history. Lalueza-Fox describes genetic studies, made possible by novel DNA sequencing technologies, that reveal layers of inequality in past societies, manifested in patterns of migration, social structures, and funerary practices. Through their DNA, ancient skeletons have much to tell us, yielding anonymous stories of inequality, bias, and suffering.
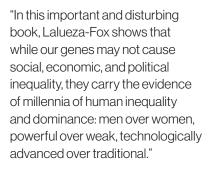
Lalueza-Fox, a leader in paleogenomics, offers the deep history of inequality. He explores the ancestral shifts associated with migration and describes the gender bias unearthed in these migrations—the brutal sexual asymmetries, for example, between male European explorers and the women of Latin America that are revealed by DNA analysis. He considers social structures, and the evidence that high social standing was inherited—the ancient world was not a meritocracy. He untangles social and genetic factors to consider whether wealth is an advantage in reproduction, showing why we are more likely to be descended from a king than a peasant. And he explores the effects of ancient inequality on the human gene pool. Marshaling a range of evidence, Lalueza-Fox shows that understanding past inequalities is key to understanding present ones.

Carles Lalueza-Fox is Research Professor and Director of the Paleogenomics Lab at the Institute of Evolutionary Biology (CSIC-Universitat Pompeu Fabra) in Barcelona. He participated in the Neandertal Genome Project and led the first retrieval of the genome of an 8,000-year-old European hunter-gatherer.
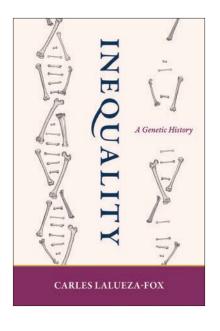
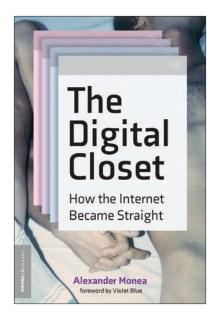"In this important and disturbing book, Lalueza-Fox shows that while our genes may not cause social, economic, and political inequality, they carry the evidence of millennia of human inequality and dominance: men over women, powerful over weak, technologically advanced over traditional."

—Patrick J. Geary, Professor Emeritus, Institute for Advanced Study

The Digital Closet

How the Internet Became Straight

Alexander Monea

An exploration of how heteronormative bias is deeply embedded in the internet, hidden in algorithms, keywords, content moderation, and more.

In *The Digital Closet*, Alexander Monea argues provocatively that the internet became straight by suppressing everything that is not, forcing LGBTQ+ content into increasingly narrow channels—rendering it invisible through opaque algorithms, automated and human content moderation, warped keywords, and other strategies of digital overreach. Monea explains how the United States' thirty-year "war on porn" has brought about the over-regulation of sexual content, which, in turn, has resulted in the censorship of much nonpornographic content—including material on sex education and LGBTQ+ activism. In this wide-ranging, enlightening account, Monea examines the cultural, technological, and political conditions that put LGBTQ+ content into the closet.

Monea looks at the anti-porn activism of the alt-right, Christian conservatives, and anti-porn feminists, who became strange bedfellows in the politics of pornography; investigates the coders, code, and moderators whose work serves to reify heteronormativity; and explores the collateral damage in the ongoing war on porn—the censorship of LGBTQ+ community resources, sex education materials, art, literature, and other content that engages with sexuality but would rarely be categorized as pornography by today's community standards. Finally, he examines the internet architectures responsible for the heteronormalization of porn: Google Safe Search and the data structures of tube sites and other porn platforms.

Monea reveals the porn industry's deepest, darkest secret: porn is boring. Mainstream porn is stuck in a heteronormative filter bubble, limited to the same heteronormative tropes, tagged by the same hetero-normative keywords. Everyone suffers from this forced heteronormativity of the internet—suffering, Monea suggests, that could be alleviated by queering straightness and introducing feminism to dissipate the misogyny.

Alexander Monea is Assistant Professor in the English Department and Cultural Studies Program at George Mason University.

Artificial Communication

How Algorithms Produce Social Intelligence

Elena Esposito

A proposal that we think about digital technologies such as machine learning not in terms of artificial intelligence but as artificial communication.

Algorithms that work with deep learning and big data are getting so much better at doing so many things that it makes us uncomfortable. How can a device know what our favorite songs are, or what we should write in an email? Have machines become too smart? In *Artificial Communication*, Elena Esposito argues that drawing this sort of analogy between algorithms and human intelligence is misleading. If machines contribute to social intelligence, it will not be because they have learned how to think like us but because we have learned how to communicate with them. Esposito proposes that we think of "smart" machines not in terms of artificial intelligence but as artificial communication.

To do this, we need a concept of communication that can take into account the possibility that a communication partner may not be a human being but an algorithm—which is not random and is completely controlled, although not by the processes of the human mind. Esposito investigates this by examining the use of algorithms in different areas of social life. She explores the proliferation of lists (and lists of lists) online, explaining that the web works on the basis of lists to produce further lists; the use of visualization; digital profiling and algorithmic individualization, which personalize a mass medium with playlists and recommendations; and the implications of the "right to be forgotten." Finally, she considers how photographs today seem to be used to escape the present rather than to preserve a memory.

Elena Esposito is Professor of Sociology at the University Bielefeld and the University of Bologna.

technology

April | 6 x 9, 208 pp. | 1 illus.

US $27.95T/$36.95 CAN cloth
978-0-262-04666-4

Strong Ideas series

Notes from Another Los Angeles

Gregory Ain and the Construction of a Social Landscape

edited by Anthony Fontenot

The first book to focus on California architect Gregory Ain's housing projects, which featured open kitchens, movable walls, and other design innovations.

The Southern California architect Gregory Ain (1908–1988) collaborated with some of the most celebrated figures of midcentury design, including Rudolph Schindler, Richard Neutra, and Charles and Ray Eames, and yet is relatively unknown today. Although Ain designed many private homes for wealthy liberals, he was more interested in finding ways to produce high-quality, low-cost houses in well-designed neighborhood settings for working-class families. This is the first book to focus on these innovative housing projects and examne the way they synthesized Ain's architectural and political ideals.

The book presents historical black-and-white photographs by the celebrated photographer of midcentury modern architecture Julius Shulman, depicting the houses in their original condition, as well as contemporary color photographs by Kyungsub Shin showing four of Ain's built housing projects—Dunsmuir Flats, Park Planned Homes, Avenal Cooperative Housing, and Mar Vista Housing. These are accompanied by essays by contemporary historians and historical articles written by and about Ain, including a previously unpublished text by Esther McCoy.

Ain's housing projects represented a new paradigm in neighborhood design that celebrated the everyday life and diversity of ordinary people. Ain's innovations—including open kitchens and movable partition walls for a "flexible" house—aimed to solve specific problems rather than pursue arbitrary expressions of uniqueness. His high-density developments anticipate contemporary efforts to design buildings with a minimal-footprint. Generously illustrated, this volume reintroduces Ain to a forgetful field.

Anthony Fontenot is Professor of Architecture at Woodbury University School of Architecture in Los Angeles and the author of *Non-Design: Architecture, Liberalism, and the Market.*

Contributors

Anthony Denzer, Anthony Fontenot, Anali Gharakhani, Esther McCoy, Nicholas Olsberg, Kyungsub Shin, Julius Schulman

architecture

June | 7 1/4 x 9 3/4, 324 pp. | 100 color illus., 66 b&w illus.

US $44.95T/$59.95 CAN paper
978-0-262-04665-7

The Polyhedrists

Art and Geometry in the Long Sixteenth Century

Noam Andrews

A history of the relationship between art and geometry in the early modern period.

In *The Polyhedrists*, Noam Andrews unfolds a history of the relationship between art and geometry in early modern Europe, told through a collective of ground-breaking artist-artisans (among them, Albrecht Dürer, Wenzel Jamnitzer, and Lorentz Stöer) and by detailed analysis of a rich visual panoply of their work, featuring paintings, prints, decorative arts, cabinetry, and lavishly illustrated treatises. But this is also a history of polyhedra themselves, one that charts their progressive estrangement from text-bound instruction in mathematics and philosophy and their subsequent transformation into emblems of virtuosity and bravura. Whether the Platonic tetrahedron or the "irregular" rhombicosido-decahedron, it was polyhedra that came to constitute an iconography of geometrical abundance.

The Polyhedrists argues that the geometrical oeuvre of Dürer, Jamnitzer, et al. consisted of more than perspectival follies destined to be superseded by later developments in higher-level mathematics. In fact, the evolution of the Platonic solids into innumerable "irregular bodies" constituted a sustained moment in the formulation of Renaissance mathematical knowledge and its engagement with materiality. This intense field of experimentation birthed a language of geometrical abstraction that would ignite a century of novel form-making strategies, ultimately paving the way for developments in geometry and topology in the nineteenth and early twentieth centuries and prefiguring the more recent digital turn. Hence the book is both an expansive history of geometry made visible and a manifest of a very particular, polyhedral fascination. Taken together, they plot a new trail into the wilds of art and science.

Noam Andrews, a historian of science and an architect, is a Research Fellow in the Faculty of Arts and Philosophy at Ghent University, Belgium.

Radical Pedagogies

edited by Beatriz Colomina, Ignacio G. Galán, Evangelos Kotsioris, and Anna-Maria Meister

Experiments in architectural education in the post–World War II era that challenged and transformed architectural discourse and practice.

In the decades after World War II, new forms of learning transformed architectural education. These radical experiments sought to upend disciplinary foundations and conventional assumptions about the nature of architecture as much as they challenged modernist and colonial norms, decentered building, imagined new roles for the architect, and envisioned participatory forms of practice. Although many of the experimental programs were subsequently abandoned, terminated, or assimilated, they nevertheless helped shape and in some sense define architectural discourse and practice. This book explores and documents these radical pedagogies and efforts to defy architecture's status quo.
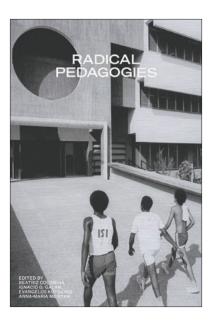
The experiments include the adaptation of Bauhaus pedagogy as a means of "unlearning" under the conditions of decolonization in Africa; a movement to design for "every body," including the disabled, by architecture students and faculty at the University of California, Berkeley; the founding of a support network for women interested in the built environment, regardless of their academic backgrounds; and a design studio in the USSR that offered an alternative to the widespread functionalist approach in Soviet design. Viewed through their dissolution and afterlife as well as through their founding stories, these projects from the last century raise provocative questions about architecture's role in the new century.
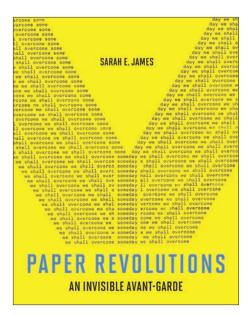
Beatriz Colomina is Howard Crosby Butler Professor of the History of Architecture at Princeton University and the author of *X-Ray Architecture* and other books. **Ignacio G. Galán** is Assistant Professor at Barnard College, Columbia University. **Evangelos Kotsioris**, an architectural historian, architect, and curator, is a Curatorial Assistant in the Department of Architecture and Design at the Museum of Modern Art in New York. **Anna-Maria Meister** is Professor of Architecture Theory and Science at Technical University of Darmstadt.

Paper Revolutions

An Invisible Avant-Garde

Sarah E. James

The experimental practices of a group of artists in the former East Germany upends assumptions underpinning Western art's postwar histories.

In *Paper Revolutions*, Sarah James offers a radical rethinking of experimental art in the former East Germany (the GDR). Countering conventional accounts that claim artistic practices in the GDR were isolated and conservative, James introduces a new narrative of neo-avantgarde practice in the Eastern Bloc that subverts many of the assumptions underpinning Western art's postwar histories. She grounds her argument in the practice of four artists who, uniquely positioned outside academies, museums, and the art market, as they functioned in the West, created art in the blind spots of state censorship. They championed ephemeral practices often marginalized by art history: postcards and letters, maquettes and models, portfolios and artists' books. Through their "lived modernism," they produced bodies of work animated by the radical legacies of the interwar avant-garde.

James examines the work and daily practices of the constructivist graphic artist, painter, and sculptor Hermann Glöckner; the experimental graphic artist and concrete and sound poet Carlfriedrich Claus; the mail artist, concrete poet, and conceptual artist Ruth Wolf-Rehfeldt; and the mail artist, "visual poet," and installation artist Karla Sachse. She shows that all of these artists rejected the idea of art as a commodity or a rarefied object, and instead believed in the potential of art to create collectivized experiences and change the world. James argues that these artists, entirely neglected by Western art history, produced some of the most significant experimental art to emerge from Germany during the Cold War.

Sarah E. James, an art historian and writer, is the author of *Common Ground: German Photographic Cultures Beyond the Iron Curtain*. Currently a Gerda Henkel Professorial Fellow in Frankfurt am Main, she was Associate Professor in History of Art at University College London and Lecturer at the University of Oxford.

"This fascinating study exposes a lifeworld of intimate and sustaining vanguard artistic exchanges that thrived in unofficial corners of the East German regime. Sidestepping tired Cold War narratives of East German art, Sarah James's poignant account also situates these objects and exchanges within a legacy of Marxist utopianism that surfaced in the German Weimar Republic and continues to resurface in imaginings of a better world today."

—Barbara McCloskey, Professor of Art History, University of Pittsburgh; author of *The Exile of George Grosz: Modernism, America, and the One World Order*

Parallel Public

Experimental Art in Late East Germany

Sara Blaylock

How East German artists made their country's experimental art scene a form of (counter) public life.

Experimental artists in the final years of the German Democratic Republic did not practice their art in the shadows, on the margins, hiding away from the Stasi's prying eyes. In fact, as Sara Blaylock shows, many cultivated a critical influence over the very bureaucracies meant to keep them in line, undermining state authority through forthright rather than covert projects. In *Parallel Public*, Blaylock describes how some East German artists made their country's experimental art scene a form of (counter) public life, creating an alternative to the crumbling collective underpinnings of the state.

Blaylock examines the work of artists who used body-based practices—including performance, film, and photography—to create new vocabularies of representation, sharing their projects through independent networks of dissemination and display. From the collective films and fashion shows of Erfurt's Women Artists Group, which fused art with feminist political action, to Gino Hahnemann, the queer filmmaker and poet who set nudes alight in city parks, these creators were as bold in their ventures as they were indifferent to state power.

Parallel Public is the first work of its kind on experimental art in East Germany to be written in English. Blaylock draws on extensive interviews with artists, art historians, and organizers; artist-made publications; official reports from the Union of Fine Artists; and Stasi surveillance records. As she recounts the role culture played in the GDR's rapid decline, she reveals East German artists as dissenters and witnesses, citizens and agents, their work both antidote for and diagnosis of a weakening state.

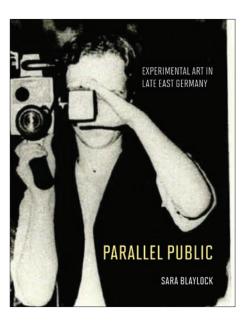**Sara Blaylock** is Assistant Professor of Art History at the University of Minnesota Duluth.

art

February | 7 x 9, 328 pp. | 81 illus.

US $34.95T/$45.95 CAN cloth
978-0-262-04663-3

"Sara Blaylock's pioneering book moves beyond the idea that art in the GDR was monolithic, isolated, or secretive. Instead of merely reacting to state power, the performance-based artworks presented in this highly readable study suggest forms of being and working together that echo the ethical and political commitments that once, long ago, accompanied the GDR's foundation."

—Sven Spieker, University of California, Santa Barbara

On Bramante

Pier Paolo Tamburelli

A new interpretation of the work of Bramante, suggesting an agenda for contemporary architectural practice.

In *On Bramante*, architect Pier Paolo Tamburelli considers the work of the celebrated Italian Renaissance architect Donato Bramante and through this suggests a possible agenda for current architectural practice. Bramante, Tamburelli argues, offers an excellent starting point to imagine a contemporary theory of space, to reflect on the relationship between architecture and politics, and to look back—with neither nostalgia nor contempt—at the tradition of Western classicism.

Starting from a discussion of the difference in the work of Bramante in Milan (1481–1499) and Rome (1499–1514), Tamburelli highlights the peculiarities of Bramante's architecture, especially in comparison to that of his predecessor Leon Battista Alberti and successor Andrea Palladio. This in turn opens up new possibilities for appreciating his spatial experiments, and to derive from Bramante's abstraction and disassociation of form from function a revised theory of space for contemporary architecture. Such a theory might even advance a newfound political understanding of classicism, and a model—perhaps more valid now than ever before—for a public architecture.

The text is bookended by a series of color photographic plates of Bramante's works by photographer Bas Princen.

Pier Paolo Tamburelli is an architect. One of the founding partners of baukuh and a former editor of *San Rocco*, he currently holds the Chair of Design Theory at the Technical University of Vienna.

Perspecta 54

Atopia

The Yale Architectural Journal

edited by Melinda Agron, Timon Covelli, Alexis Kandel, and David Langdon

Atopia as both the site of architecture's critical confrontation with hegemonic systems and the theoretical space in which its own processes can be challenged.

A literal no-place, atopia represents the spatial end-product of a society seemingly flattened by supra-territorial flows of information and material. It expresses both a physical artifact and condition of mass culture, and like the global systems of production and consumption from which it is conceived, atopia is both nowhere and everywhere at once. For the contributors to *Perspecta 54*, the ephemeral conditions of atopia are also an invitation to an equally unconstrained critical practice. Blurred boundaries—geopolitical, virtual, technical, disciplinary—offer sites for transgressive speculation and critique from beyond the limits of traditional design agency.

What results is a form of design practice that ambiguously straddles impossibility and hyperreality. Atopia rejects both the escapist fantasy of utopia and the nihilism of dystopia, favoring instead a conceptual middle ground from which real-world conditions can be productively engaged and challenged. Architecture's traditional objectives of critical inquiry—particularly the location of modes of complicity, agency, and resistance within larger structures—are mediated and reframed through nontraditional strategies of speculative design and fiction. From urban crises and climate emergencies to border disputes and geopolitics, *Perspecta 54* examines atopia as both the site of architecture's critical confrontation with hegemonic systems and the theoretical space in which its own processes can be challenged.

Melinda Agron, **Timon Covelli**, **Alexis Kandel**, and **David Langdon** are all graduates of Yale School of Architecture.
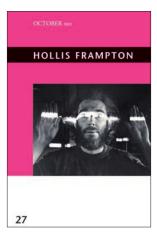
Hollis Frampton

edited by Michael Zryd

The first collection of critical writing on the work of experimental filmmaker Hollis Frampton.

Hollis Frampton (1936–1984) was one of the most important experimental filmmakers and theorists of his time, and in his navigation of artistic media and discourses, he anticipated the multimedia boundary blurring of today's visual culture. Indeed, his photography continues to be exhibited, and a digital edition of his films was issued by the Criterion Collection. This book offers the first collection of critical writings on Frampton's work. It complements *On the Camera Arts and Consecutive Matter*, published in the MIT Press's Writing Art series, which collected Frampton's own writings.

October was as central to Frampton as he was to it. He was both a frequent contributor—appearing in the first issue in 1976—and a frequent subject of contributions by others. Some of these important and incisive writings on Frampton's work are reprinted here. The essays collected in this volume consider Frampton's photographic practice, which continued even after he turned to film; survey his film work from the 1960s to the late 1970s; and explore Frampton's grounding in poetics and language. Two essays by the late Annette Michelson, one of the twentieth century's most influential writers on experimental film, place Frampton in relation to film and art history.

Michael Zryd is Associate Professor at the Department of Cinema and Media Arts at York University in Toronto.

THE MIT PRESS ESSENTIAL KNOWLEDGE SERIES

The MIT Press Essential Knowledge series offers accessible, concise, beautifully produced books on topics of current interest. Written by leading thinkers, the books in this series deliver expert overviews of subjects that range from the cultural and the historical to the scientific and the technical. In today's era of instant information gratification, we have ready access to opinions, rationalizations, and superficial descriptions. Much harder to come by is the foundational knowledge that informs a principled understanding of the world. Essential Knowledge books fill that need. Synthesizing specialized subject matter for nonspecialists and engaging critical topics through fundamentals, each of these compact volumes offers readers a point of access to complex ideas.

Content

Kate Eichhorn

A concise introduction to content and the content industry, from the early internet to the Instagram egg.

From the time we roll out of bed to check overnight updates to our last posts, likes, and views of the previous day, we're consuming and producing content. But what does the term "content" even mean? When did it become ubiquitous? And at what cost? In this volume in the MIT Press Essential Knowledge series, Kate Eichhorn offers a concise introduction to content and the content industry, examining the far-reaching effects content has on culture, politics, and labor in a digital age.

Eichhorn traces the evolution of our current understanding of content from the early internet to the current social mediaverse. The quintessential example of content, she says, is the Instagram egg—an image that imparted no information or knowledge and circulated simply for the sake of circulation. Eichhorn explores what differentiates user-generated content from content produced by compensated (although often undercompensated) workers; examines how fields from art and literature to journalism and politics have weathered the rise of the content industry; and investigates the increasing importance of artists' "content capital"—the ability of artists, writers, and performers to produce content not about their work but about their status as artists.

Kate Eichhorn is Associate Professor and Chair of Culture and Media Studies at The New School. She is the author of *The End of Forgetting: Growing Up with Social Media*, *Adjusted Margin: Xerography, Art and Activism in the Late Twentieth Century* (MIT Press), and *The Archival Turn in Feminism*.
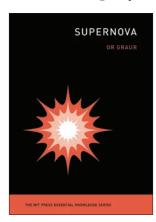
Supernova

Or Graur

A concise introduction to the history and physics of supernovae, the brilliant explosions of stars; with striking color illustrations.

Supernovae are the explosions of stars. They are some of the most energetic phenomena in the Universe, rivaling the combined light of billions of stars. Supernovae have been studied for centuries, and they have also made appearances in popular culture: a glimpse of a supernova in a painting provides Sherlock Holmes with a crucial clue, for example. In this volume in the MIT Press Essential Knowledge series, astrophysicist Or Graur offers a concise and accessible introduction to these awe-inspiring astronomical phenomena.

Graur explains that a deep observational understanding of supernovae—why and how they shine and how their brightness changes over time—allows us to use them as tools for experiments in astrophysics and physics. A certain type of supernova, for example, brightens and fades in such a predictable manner that we can measure the distances to their host galaxies. We owe our existence to supernovae—they give us iron for our blood and calcium for our bones. But supernovae may also have caused a mass extinction event on Earth 2.6 million years ago.

Graur shows how observations of supernovae played a role in the transformation of astronomy from astrology to astrophysics; surveys the tools used to study supernovae today; and describes the lives and deaths of stars and the supernova remnants, neutron stars, and black holes they leave behind. Illustrations in both color and black and white, many from Graur's own Hubble Space Telescope data, make this account of supernovae particularly vivid.

Or Graur is Senior Lecturer in Astrophysics at the University of Portsmouth's Institute of Cosmology and Gravitation.

science | astronomy

February | 5 x 7, 240 pp. | 8 color plates, 20 b&w illus.,

US $16.95T/$22.95 CAN paper
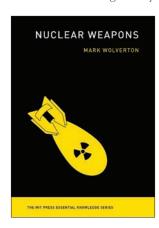978-0-262-54314-9

The MIT Press Essential Knowledge series

Nuclear Weapons

Mark Wolverton

A primer on nuclear weapons, from the science of fission and fusion to the pursuit of mutual assured destruction, the SALT treaties, and the Bomb in pop culture.

Although the world's attention has shifted to drone-controlled bombing and cyberwarfare, the threat of nuclear war still exists. There are now fourteen thousand nuclear weapons in the hands of the nine declared nuclear powers. Even though the world survived the Cold War, we need to understand what it means to live with nuclear weapons. In this volume in the MIT Press Essential Knowledge series, Mark Wolverton offers a primer on nuclear weapons, from the science of fission and fusion to the pursuit of mutual assured destruction, the SALT and START agreements, and the Bomb in pop culture.

Wolverton explains the basic scientific facts, offers historical perspective, and provides a nuanced view of the unique political, social, and moral dilemmas posed by nuclear weapons. He describes the birth of the Bomb in 1945 and its use against the Japanese cities of Hiroshima and Nagasaki; explains how a nuclear bomb works; recounts episodes when the world came close to waging nuclear war, including the Cuban missile crisis in 1962; discusses nuclear policy and nuclear treaties; and traces the influence of such films as *On the Beach*, *Dr. Strangelove*, and *The Day After*.

Mark Wolverton is a science writer and the author of *Burning the Sky: Operation Argus and the Untold Story of the Cold War Nuclear Tests in Outer Space*, *A Life in Twilight: The Final Years of J. Robert Oppenheimer*, and *The Depths of Space: The Story of the Pioneer Planetary Probes*. His journalism has appeared in *WIRED*, *Nature*, *Undark*, *Scientifc American*, *Air & Space Smithsonian*, and other publications.

history | technology

February | 5 x 7, 280 pp. | 12 illus.
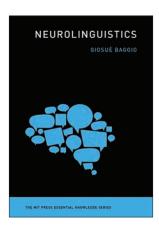
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The MIT Press Essential Knowledge series

Neurolinguistics

Giosuè Baggio

An accessible introduction to the study of language in the brain, covering language processing, language acquisition, literacy, and language disorders.

Neurolinguistics, the study of language in the brain, describes the anatomical structures (networks of neurons in the brain) and physiological processes (ways for these networks to be active) that allow humans to learn and use one or more languages. It draws on neuroscience, linguistics—particularly theoretical linguistics—and other disciplines. In this volume in the MIT Press Essential Knowledge series, Giosuè Baggio offers an accessible introduction to the fundamentals of neurolinguistics, covering language processing, language acquisition, literacy, and speech and language disorders.

Baggio first surveys the evolution of the field, describing discoveries by Paul Broca, Carl Wernicke, Noam Chomsky, and others. He discusses mapping language in "brain time" and "brain space" and the constraints of neurolinguistic models. Considering language acquisition, he explains that a child is never a "blank slate": infants and young children are only able to acquire specific aspects of language in specific stages of cognitive development. He addresses the neural consequences of bilingualism; literacy, discussing how forms of visual language in the brain differ from forms of auditory language; aphasia and the need to understand language disorders in behavioral, functional, and neuroanatomical terms; neurogenetics of language; and the neuroethology of language, tracing the origins of the neural and behavioral building blocks of human linguistic communication to the evolution of avian, mammalian, and primate brains.

Giosuè Baggio is Professor of Psycholinguistics at the Norwegian University of Science and Technology in Trondheim, Norway, and the author of *Meaning in the Brain* (MIT Press).

Echo

Amit Pinchevski

An exploration of echo not as simple repetition but as an agent of creative possibilities.

In this volume in the MIT Press Essential Knowledge series, Amit Pinchevski proposes that echo is not simple repetition and the reproduction of sameness but an agent of change and a source of creation and creativity. Pinchevski views echo as a medium, connecting and mediating across and between disparate domains. He reminds us that the mythological Echo, sentenced by Juno to repeat the last words of others, found a way to make repetition expressive. So too does echo introduce variation into sameness, mediating between self and other, inside and outside, known and unknown, near and far. Echo has the potential to bring back something unexpected, either more or less than what was sent.

Pinchevski distinguishes echo from the closely related but sometimes conflated reflection, reverberation, and resonance; considers echolalia as an active, reactive, and creative vocalic force, the launching pad of speech; and explores echo as a rhetorical device, steering between appropriation and response while always maintaining relation. He examines the trope of echo chamber and both destructive and constructive echoing; describes various echo techniques and how echo can serve practical purposes from echolocation in bats and submarines to architecture and sound recording; explores echo as a link to the past, both literally and metaphorically; and considers echo as medium using Marshall McLuhan's tetrad.

Amit Pinchevski is Associate Professor in the Department of Communication and Journalism at the Hebrew University of Jerusalem. He is the author of *By Way of Interruption: Levinas and the Ethics of Communication* and *Transmitted Wounds: Media and the Mediation of Trauma.*

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Social Engineering

How Crowdmasters, Phreaks, Hackers, and Trolls Created a New Form of Manipulative Communication

Robert W. Gehl and Sean T. Lawson

Manipulative communication—from early twentieth-century propaganda to today's online con artistry—examined through the lens of social engineering.

The United States is awash in manipulated information about everything from election results to the effectiveness of medical treatments. Corporate social media is an especially good channel for manipulative communication, with Facebook a particularly willing vehicle for it. In *Social Engineering*, Robert Gehl and Sean Lawson show that online misinformation has its roots in earlier techniques: mass social engineering of the early twentieth century and interpersonal hacker social engineering of the 1970s, converging today into what they call "masspersonal social engineering." As Gehl and Lawson trace contemporary manipulative communication back to earlier forms of social engineering, possibilities for amelioration become clearer.
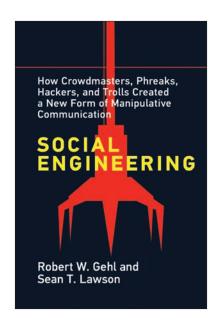
The authors show how specific manipulative communication practices are a mixture of information gathering, deception, and truth-indifferent statements, all with the instrumental goal of getting people to take actions the social engineer wants them to. Yet the term "fake news," they claim, reduces everything to a true/false binary that fails to encompass the complexity of manipulative communication or to map onto many of its practices. They pay special attention to concepts and terms used by hacker social engineers, including the hacker concept of "bullshitting," which the authors describe as a truth-indifferent mix of deception, accuracy, and sociability. They conclude with recommendations for how society can undermine masspersonal social engineering and move toward healthier democratic deliberation.

Robert W. Gehl is F. Jay Taylor Endowed Research Chair of Communication at Louisiana Tech University and the author of *Weaving the Dark Web* (MIT Press). **Sean T. Lawson** is Associate Professor of Communication at the University of Utah, Non-Resident Fellow at the Brute Krulak Center for Innovation & Future Warfare at the Marine Corps University, and author of *Cybersecurity Discourse in the United States*.

Buy Now

How Amazon Branded Convenience and Normalized Monopoly

Emily West

How Amazon combined branding and relationship marketing with massive distribution infrastructure to become the ultimate service brand in the digital economy.

Amazon is ubiquitous in our daily lives—we stream movies and television on Amazon Prime Video, converse with Alexa, receive messages on our smartphone about the progress of our latest orders. In *Buy Now*, Emily West examines Amazon's consumer-facing services to investigate how Amazon as a brand grew so quickly and inserted itself into so many aspects of our lives even as it faded into the background, becoming a sort of infrastructure that can be taken for granted. Amazon promotes the comfort and care of its customers (but not its workers) to become the ultimate service brand in the digital economy.

West shows how Amazon has cultivated personalized, intimate relationships with consumers that normalize its outsized influence on our selves and our communities. She describes the brand's focus on speedy and seamless ecommerce delivery, represented in the materiality of the branded brown box; the positioning of its book retailing, media streaming, and smart speakers as services rather than sales; and the brand's image control strategies. West considers why pushback against Amazon's ubiquity and market power has come mainly from among Amazon's workers rather than its customers or competitors, arguing that Amazon's brand logic fragments consumers as a political bloc. West's innovative account, the first to examine Amazon from a critical media studies perspective, offers a cautionary cultural study of bigness in today's economy.

Emily West is Associate Professor of Communication at the University of Massachusetts Amherst and coeditor of *The Routledge Companion to Advertising and Promotional Culture*.

business | media studies

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Distribution Matters series

"West brilliantly documents how the global master of one-click shopping, ubiquitous surveillance, and monopoly power, became a serious threat to democracy, to the climate, and to a humane workplace."

—Vincent Mosco, author of *The Smart City in a Digital World*

Beyond Coding

How Children Learn Human Values through Programming

Marina Umaschi Bers

Why children should be taught coding not as a technical skill but as a new literacy—a way to express themselves and engage with the world.

Today, schools are introducing STEM education and robotics to children in ever-lower grades. In *Beyond Coding*, Marina Umaschi Bers lays out a pedagogical roadmap for teaching code that encompasses the cultivation of character along with technical knowledge and skills. Presenting code as a universal language, she shows how children discover new ways of thinking, relating, and behaving through creative coding activities. Today's children will undoubtedly have the technical knowledge to change the world. But cultivating strength of character, socioeconomic maturity, and a moral compass alongside that knowledge, says Bers, is crucial.
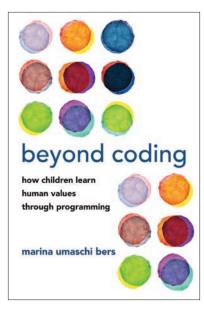
Bers, a leading proponent of teaching computational thinking and coding as early as preschool and kindergarten, presents examples of children and teachers using the Scratch Jr. and Kibo robotics platforms to make explicit some of the positive values implicit in the process of learning computer science. If we are to do right by our children, our approach to coding must incorporate the elements of a moral education: the use of narrative to explore identity and values, the development of logical thinking to think critically and solve technical and ethical problems, and experiences in the community to enable personal relationships. Through learning the language of programming, says Bers, it is possible for diverse cultural and religious groups to find points of connection, put assumptions and stereotypes behind them, and work together toward a common goal.
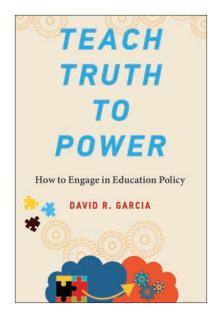
Marina Umaschi Bers is Professor and Chair of the Eliot-Pearson Department of Child Study and Human Development at Tufts University, with a secondary appointment in the Computer Science Department. She directs the interdisciplinary DevTech Research Group.

Teach Truth to Power

How to Engage in Education Policy

David R. Garcia

How academics and researchers can influence education policy: putting research in a policy context, finding unexpected allies, interacting with politicians, and more.

Scholarly books and journal articles routinely close with policy recommendations. Yet these recommendations rarely reach politicians. How can academics engage more effectively in the policy process? In *Teach Truth to Power*, David Garcia offers a how-to guide for scholars and researchers who want to influence education policy, explaining strategies for putting research in a policy context, getting "in the room" where policy happens, finding unexpected allies, interacting with politicians, and more.

Countering conventional wisdom about research utilization (also referred to as knowledge mobilization), Garcia explains that engaging in education policy is not a science, it is a craft—a combination of acquired knowledge and intuition that must be learned through practice. Engaging in policy is an interpersonal process; academics who hope to influence policy have to get face-to-face with the politicians who create policy. Garcia's experience as trusted insider, researcher, and political candidate make him uniquely qualified to offer a roadmap that connects research to policy. He explains that academics can leverage their content expertise to build relationships with politicians (even before they are politicians); demonstrates the effectiveness of the research one-pager; and shows how academics can teach politicians to be champions of research.

David R. Garcia is Associate Professor in the Mary Lou Fulton Teachers College at Arizona State University. A former Arizona Associate Superintendent of Public Instruction, he was Arizona's Democratic candidate for governor in 2018. He is the author of *School Choice*, a volume in the MIT Press Essential Knowledge series.

"David Garcia is the perfect person to write this book, and he does so flawlessly. It's clear, down-to-earth, and informed by academic literature as well as his personal experience bridging the worlds of research and policy practice."

—Jeffrey R. Henig, Professor of Political Science and Education, Teachers College, Columbia University; author of *Spin Cycle: How Research Gets Used in Policy Debates*

Design as Democratic Inquiry
Putting Experimental Civics into Practice

Carl DiSalvo

Through practices of collaborative imagination and making, or "doing design otherwise," design experiments can contribute to keeping local democracies vibrant.

"The vision of design that DiSalvo outlines is experimental, problem-making over problem-solving, and oriented towards caring for our collective futures. This rich and humble book gave me hope for both the future of design and the future of democracy."

—Catherine D'Ignazio, Assistant Professor, MIT, and Director, Data + Feminism Lab, MIT; coauthor of *Data Feminism*

In this counterpoint to the grand narratives of design punditry, Carl DiSalvo presents what he calls "doing design otherwise." Arguing that democracy requires constant renewal and care, he shows how designers can supply novel contributions to local democracy by drawing together theory and practice, making and reflection. The relentless pursuit of innovation, uncritical embrace of the new and novel, and treatment of all things as design problems, says DiSalvo, can lead to cultural imperialism. In *Design as Democratic Inquiry*, he recounts a series of projects that exemplify engaged design in practice. These experiments in practice-based research are grounded in collaborations with communities and institutions.

The projects DiSalvo describes took place from 2014 to 2019 in Atlanta. Rather than presume that government, industry—or academia—should determine the outcome, the designers began with the recognition that the residents and local organizations were already creative and resourceful. DiSalvo uses the projects to show how design might work as a mode of inquiry. Resisting heroic stories of design and innovation, he argues for embracing design as fragile, contingent, partial, and compromised. In particular, he explores how design might be leveraged to facilitate a more diverse civic imagination. A fundamental tenet of design is that the world is made, and therefore it could be made differently. A key concept is that democracy requires constant renewal and care. Thus, designing becomes a way to care, together, for our collective future.

Carl DiSalvo is Associate Professor at the Georgia Institute of Technology, with appointments in the School of Interactive Computing and the School of Literature, Media, and Communication. He is the author of *Adversarial Design* (MIT Press).
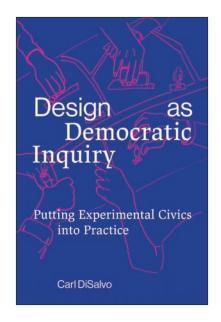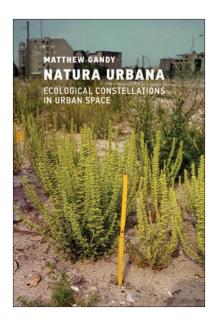
Natura Urbana

Ecological Constellations in Urban Space

Matthew Gandy

A study of urban nature that draws together different strands of urban ecology as well as insights derived from feminist, posthuman, and postcolonial thought.

Postindustrial transitions and changing cultures of nature have produced an unprecedented degree of fascination with urban biodiversity. The "other nature" that flourishes in marginal urban spaces, at one remove from the controlled contours of metropolitan nature, is not the poor relation of rural flora and fauna. Indeed, these islands of biodiversity underline the porosity of the distinction between urban and rural. In *Natura Urbana*, Matthew Gandy explores urban nature as a multilayered material and symbolic entity, through the lens of urban ecology and the parallel study of diverse cultures of nature at a global scale.

Gandy examines the articulation of alternative, and in some cases counterhegemonic, sources of knowledge about urban nature produced by artists, writers, scientists, as well as curious citizens, including voices seldom heard in environmental discourse. The book is driven by Gandy's fascination with spontaneous forms of urban nature ranging from postindustrial wastelands brimming with life to the return of such predators as wolves and leopards on the urban fringe. Gandy develops a critical synthesis between different strands of urban ecology and considers whether "urban political ecology," broadly defined, might be imaginatively extended to take fuller account of both the historiography of the ecological sciences and recent insights derived from feminist, posthuman, and postcolonial thought.

Matthew Gandy is Professor of Geography at the University of Cambridge and the author of *Concrete and Clay* and *The Fabric of Space*, both published by the MIT Press.

"Gandy's majestic exploration of the posthuman, postcolonial 'ecological pluriverse' of cultural, material, and biophysical traces from across the globe opens a treasure trove of new ways to understand the fluidity of urban ecologies and natures."

—Julian Agyeman, Tufts University

Treacherous Play

Marcus Carter

The ethics and experience of "treacherous play": an exploration of three games that allow deception and betrayal—*EVE Online*, *DayZ*, and *Survivor*.

Deception and betrayal in gameplay are generally considered off-limits, designed out of most multiplayer games. There are a few games, however, in which deception and betrayal are allowed, and even encouraged. In *Treacherous Play*, Marcus Carter explores the ethics and experience of playing such games, offering detailed explorations of three games in which this kind of "dark play" is both lawful and advantageous: *EVE Online*, *DayZ*, and the television series *Survivor*. Examining aspects of games that are often hidden, ignored, or designed away, Carter shows the appeal of playing treacherously.

Carter looks at *EVE Online*'s notorious scammers and spies, drawing on his own extensive studies of them, and describes how treacherous play makes *EVE* successful. Making a distinction between treacherous play and griefing or trolling, he examines the experiences of *DayZ* players to show how negative experiences can be positive in games, and a core part of their appeal. And he explains how in *Survivor*'s tribal council votes, a player's acts of betrayal can exact a cost. Then, considering these games in terms of their design, he discusses how to design for treacherous play.

Carter's account challenges the common assumptions that treacherous play is unethical, antisocial, and engaged in by bad people. He doesn't claim that more games should feature treachery, but that examining this kind of play sheds new light on what play can be.

Marcus Carter is Senior Lecturer in Digital Cultures in the Department of Media and Communications at the University of Sydney.

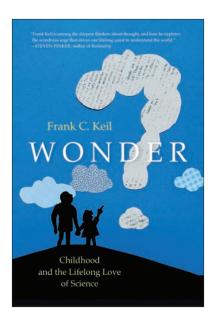"A fascinating study in nontraditional game design. Marcus Carter's *Treacherous Play* includes some of the best writing about *EVE Online* yet published, investigating the inherent darkness of its design and the effect on its community."

—Andrew Groen, author of *Empires of EVE: A History of the Great Wars of EVE Online*

Wonder

Childhood and the Lifelong Love of Science

Frank C. Keil

How we can all be lifelong wonderers: restoring the sense of joy in discovery we felt as children.

From an early age, children pepper adults with questions that ask why and how: Why do balloons float? How do plants grow from seeds? Why do birds have feathers? Young children have a powerful drive to learn about their world, wanting to know not just what something is but also how it got to be that way and how it works. Most adults, on the other hand, have little curiosity about whys and hows; we might unlock a door, for example, or boil an egg, with no idea of what happens to make such a thing possible. How can grown-ups recapture a child's sense of wonder at the world? In this book, Frank Keil describes the cognitive dispositions that set children on their paths of discovery and explains how we can all become lifelong wonderers.

Keil describes recent research on children's minds that reveals an extraordinary set of emerging abilities that underpin their joy of discovery—their need to learn not just the facts but the underlying causal patterns at the very heart of science. This glorious sense of wonder, however, is stifled, beginning in elementary school. Later, with little interest in causal mechanisms, and motivated by intellectual blind spots, as adults we become vulnerable to misinformation and manipulation—ready to believe things that aren't true. Of course, the polymaths among us have retained their sense of wonder, and Keil explains the habits of mind and ways of wondering that allow them—and can enable us—to experience the joy of asking why and how.

Frank C. Keil is Charles C. & Dorathea S. Dilley Professor of Psychology at Yale University, where he is also a member of the Cognition and Development Lab. He is the author of *Developmental Psychology: The Growth of Mind and Behavior* and other books.
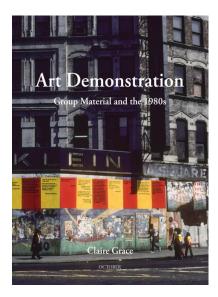
"Frank Keil is among the deepest thinkers about thought, and here he explores the wondrous urge that drives our lifelong quest to understand the world."

—Steven Pinker, Johnstone Professor of Psychology, Harvard University; author of *Rationality*

"Frank Keil is one of the great psychologists of our time, and his beautiful, brilliant, and humane work tells the story of children's fascination with the natural world, how it is brutally stifled in school, and how we can recover it as adults."

—Paul Bloom, Professor of Psychology, University of Toronto; author of *The Sweet Spot: The Pleasures of Suffering and the Search for Meaning*

Art Demonstration
Group Material and the 1980s

Claire Grace

A study of Group Material, the influential but underexamined New York–based artist collective, investigating a series of key works.

Key predecessor of contemporary art's most radical activist gestures, the 1980s collective Group Material seized upon the temporary exhibition as a prime mode of intervention. Projects sited on walls, subways, and billboards targeted some of the most sensitive political conflicts of the era, from U.S. military interventions in Latin America to the AIDS crisis. In *Art Demonstration*, Claire Grace examines Group Material's New York–based collaboration across a decade that saw a wave of renewed interest in art as a domain of political mobilization. As Grace argues here, Group Material's art was never just a means to an end; looking itself held urgency.

Grace distinguishes between two types of Group Material projects: room-scale interiors featuring distinctive wall treatments, soundtracks, and boundary-crossing arrangements of objects, and works in spaces usually reserved for advertising. Grace analyzes the group's practice in both categories, examining such well-known projects as *AIDS Timeline* (1989) and *Democracy* (1988–1989) and lesser-known works including *Subculture* (1983) and *The Castle* (1987). Grace shows that the politics running through Group Material's practice ultimately resides in the artists' particular recourse to the exhibition form. With that bearing, Group Material's work insisted on the material in the face of postmodern theory's privileging of the discursive, and redistributed authorship within protean and pivotally diverse collective structures, testing in so doing the ever fragile contours of democratic participation as art became a commodity for speculative investment.

Claire Grace is Assistant Professor in the Department of Art and Art History at Wesleyan University.

London Couture and the Making of a Fashion Centre

Michelle Jones

How design collaboration, networks, and narratives contributed to the establishment of a recognized English couture industry in the 1930s and 1940s.

In the 1930s and 1940s, English fashion houses, spurred by economic and wartime crises, put London on the map as a major fashion city. In this book, Michelle Jones examines the creation of a London-based couture industry during these years, exploring how designer collaboration and the construction of specific networks and narratives supported and shaped the English fashion economy. Haute couture—the practice of creative made-to-measure womenswear—was widely regarded as inherently French. Jones shows how an English version emerged during a period of economic turbulence, when a group of designers banded together in a collective effort to shift power within the international fashion system.

Jones considers the establishment of this form of English design practice, analyzing the commercial, social, and political factors that shaped the professional identity of the London couturiers. She focuses on collaborative activity that supported this form of elite, craft-based fashion production—from the prewar efforts of the Fashion Group of Great Britain to the wartime establishment of the Incorporated Society of London Fashion Designers, modeled loosely after French fashion's governing body, the Chambre Syndicale de la Couture Parisienne. It was these collective efforts by couturiers that established and sustained London's place as an internationally recognized center for creative fashion.
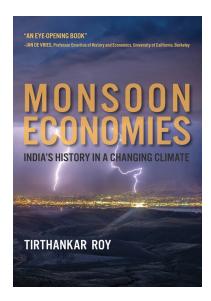
Michelle Jones is a design historian and Senior Lecturer at Central St. Martins, University of the Arts, London, and the Cambridge School of Visual and Performing Arts.

history | fashion

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"This fascinating account of London's couture industry shows us that Paris was not the only city to define itself by its commitment to fashion."

—Penny Sparke, Professor of Design History, Kingston University, London; and author of *An Introduction to Design and Culture: 1900 to the Present*

Monsoon Economies

India's History in a Changing Climate

Tirthankar Roy

How interventions to mitigate climate-caused poverty and inequality in India came at a cost to environmental sustainability.

In the monsoon regions of South Asia, the rainy season sustains life but brings with it the threat of floods, followed by a long stretch of the year when little gainful work is possible and the threat of famine looms. Beginning in the late nineteenth century, a series of interventions by Indian governments and other actors mitigated these conditions, enabling agricultural growth, encouraging urbanization, and bringing about a permanent decrease in death rates. But these actions—largely efforts to ensure wider access to water—came at a cost to environmental sustainability. In *Monsoon Economies*, Tirthankar Roy explores the interaction between the environment and the economy in the emergence of modern India.

Roy argues that the tropical monsoon climate makes economic and population growth contingent on water security. But in a water-scarce world, the means used to increase water security not only created environmental stresses but also made political conflict more likely. Roy investigates famine relief, the framing of a seasonal "water famine," and the concept of public trust in water; the political movements that challenged socially sanctioned forms of deprivation; water as a public good; water quality in cities; the shift from impounding river water in dams and reservoirs to exploring groundwater; the seasonality of a monsoon economy; and economic lessons from India for a world facing environmental degradation.
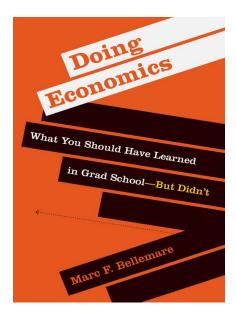
Tirthankar Roy is Professor of Economic History at the London School of Economics and Political Science. He is the author of *The Crafts and Capitalism: Handloom Weaving Industry in Colonial India* and coauthor of *The Economic History of Colonialism* and *Law and the Economy in a Young Democracy*.

Doing Economics

What You Should Have Learned in Grad School—
But Didn't

Marc F. Bellemare

A guide for research economists: how to write papers, give talks, navigate the peer-review process, advise students, and more.

Newly minted research economists are equipped with a PhD's worth of technical and scientific expertise but often lack some of the practical tools necessary for "doing economics." With this book, economics professor Marc Bellemare breaks down the components of doing research economics and examines each in turn: communicating your research findings in a paper; presenting your findings to other researchers by giving a talk; submitting your paper to a peer-reviewed journal; funding your research program through grants (necessary more often than not for all social scientists); knowing what kind of professional service opportunities to pursue; and advising PhD, master's, and undergraduate students.
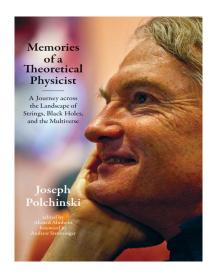
With increasing data availability and decreasing computational costs, economics has taken an empirical turn in recent decades. Academic economics is no longer the domain only of the theoretical; many young economists choose applied fields when the time comes to specialize. Yet there is no manual for surviving and thriving as a professional research economist. *Doing Economics* fills that gap, offering an essential guide for research economists at any stage of their careers.

Marc F. Bellemare is Northrop Professor of Applied Economics at the University of Minnesota and coeditor of the *American Journal of Agricultural Economics.*

Memories of a Theoretical Physicist

A Journey across the Landscape of Strings, Black Holes, and the Multiverse

Joseph Polchinski

edited by Ahmed Almheiri

foreword by Andrew Strominger

A groundbreaking theoretical physicist traces his career, reflecting on the successes and failures, triumphs and insecurities of a life cut short by cancer.

The groundbreaking theoretical physicist Joseph Polchinski explained the genesis of his memoir this way: "Having only two bodies of knowledge, myself and physics, I decided to write an autobiography about my development as a theoretical physicist." In this posthumously published account of his life and work, Polchinski (1954–2018) describes successes and failures, triumphs and insecurities, and the sheer persistence that led to his greatest discoveries. Writing engagingly and accessibly, with the wry humor for which he was known, Polchinski gives theoretical physics a very human face.

Polchinski, famous for his contributions to string theory, may have changed the course of modern theoretical physics, but he was a late bloomer—doing most of his important work after the age of forty. His death from brain cancer at sixty-three cut short a career at its peak. Working on the memoir after his diagnosis, using a text-to-speech algorithm because he could no longer read words on a page, he was able to recapitulate his entire career, down to the details of problems he had worked on. For Polchinski, physics went deeper than words.

This edition includes photographs from Polchinski's professional and family life, as well as physics explainer boxes, other technical edits, and bibliographic notes by his former student Ahmad Almheiri, a foreword by Andrew Strominger, and an afterword by his wife Dorothy Chun and sons Steven and Daniel.

Joseph Polchinski, a physicist known for his groundbreaking work in string theory, was Professor of Physics at the University of California, Santa Barbara, for many years and a permanent member of the Kavli Institute for Theoretical Physics. He was a recipient of the 2017 Breakthrough Prize in Fundamental Physics. **Ahmed Almheiri** is a long-term Member at the Institute for Advanced Study and is the recipient of the 2021 New Horizons in Physics Prize from the Breakthrough Prize Foundation.

"Joseph Polchinski was a highly influential theoretical physicist, bold in his thinking. His scientific memoir provides a fascinating account of the challenges he faced to reach the top of his profession and should be read by anyone interested in contemporary developments in fundamental physics."

—Edward Witten, Charles Simonyi Professor, School of Natural Sciences at the Institute for Advanced Study

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Probabilistic Machine Learning

An Introduction

Kevin P. Murphy

A detailed and up-to-date introduction to machine learning, presented through the unifying lens of probabilistic modeling and Bayesian decision theory.

This book offers a detailed and up-to-date introduction to machine learning (including deep learning) through the unifying lens of probabilistic modeling and Bayesian decision theory. The book covers mathematical background (including linear algebra and optimization), basic supervised learning (including linear and logistic regression and deep neural networks), as well as more advanced topics (including transfer learning and unsupervised learning). End-of-chapter exercises allow students to apply what they have learned, and an appendix covers notation.

Probabilistic Machine Learning grew out of the author's 2012 book, *Machine Learning: A Probabilistic Perspective*. More than just a simple update, this is a completely new book that reflects the dramatic developments in the field since 2012, most notably deep learning. In addition, the new book is accompanied by online Python code, using libraries such as scikit-learn, JAX, PyTorch, and Tensorflow, which can be used to reproduce nearly all the figures; this code can be run inside a web browser using cloud-based notebooks, and provides a practical complement to the theoretical topics discussed in the book. This introductory text will be followed by a sequel that covers more advanced topics, taking the same probabilistic approach.

Kevin P. Murphy is a Research Scientist at Google in Mountain View, California, where he works on AI, machine learning, computer vision, and natural language understanding.
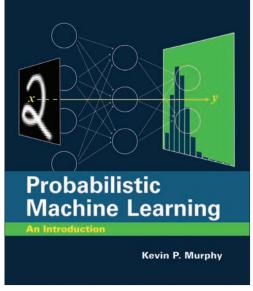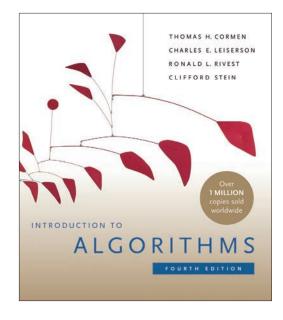
"The deep learning revolution has transformed the field of machine learning over the last decade. It was inspired by attempts to mimic the way the brain learns but it is grounded in basic principles of statistics, information theory, decision theory, and optimization. This book does an excellent job of explaining these principles and describes many of the 'classical' machine learning methods that make use of them. It also shows how the same principles can be applied in deep learning systems that contain many layers of features. This provides a coherent framework in which one can understand the relationships and tradeoffs between many different ML approaches, both old and new."

—Geoffrey Hinton, Emeritus Professor of Computer Science, University of Toronto; Engineering Fellow, Google

Introduction to Algorithms
fourth edition

Thomas H. Cormen, Charles E. Leiserson, Ronald L. Rivest, and Clifford Stein

A comprehensive update of the leading algorithm textbook, with new material on matchings in bipartite graphs, online algorithms, machine learning, and other topics.

Some books on algorithms are rigorous but incomplete; others cover masses of material but lack rigor. *Introduction to Algorithms* uniquely combines rigor and comprehensiveness. It covers a broad range of algorithms in depth, yet makes their design and analysis accessible to all levels of readers, with self-contained chapters and algorithms in pseudocode.

Since the publication of the first edition, *Introduction to Algorithms* has become the leading algorithms text in universities worldwide as well as the standard reference for professionals. This fourth edition has been updated throughout.

Thomas H. Cormen is Emeritus Professor of Computer Science at Dartmouth College. **Charles E. Leiserson** is Edwin Sibley Webster Professor in Electrical Engineering and Computer Science at MIT. **Ronald L. Rivest** is Institute Professor at MIT. **Clifford Stein** is Wai T. Chang Professor of Industrial Engineering and Operations Research, and of Computer Science at Columbia University.

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1 MILLION
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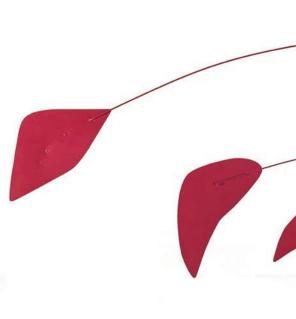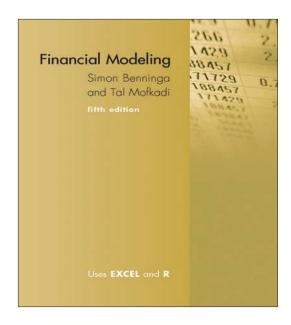
New for the fourth edition

- New chapters on matchings in bipartite graphs, online algorithms, and machine learning

- New material on topics including solving recurrence equations, hash tables, potential functions, and suffix arrays

- 140 new exercises and 22 new problems

- Reader feedback–informed improvements to old problems

- Clearer, more personal, and gender-neutral writing style

- Color added to improve visual presentation

- Notes, bibliography, and index updated to reflect developments in the field

- Website with new supplementary material

Financial Modeling

fifth edition

Simon Benninga and Tal Mofkadi

A substantially updated new edition of the essential text on financial modeling, with revised material, new data, and implementations shown in Excel, R, and Python.

Financial Modeling has become the gold-standard text in its field, an essential guide for students, researchers, and practitioners that provides the computational tools needed for modeling finance fundamentals. This fifth edition has been substantially updated but maintains the straightforward, hands-on approach, with an optimal mix of explanation and implementation, that made the previous editions so popular. Using detailed Excel spreadsheets, it explains basic and advanced models in the areas of corporate finance, portfolio management, options, and bonds. This new edition offers revised material on valuation, second-order and third-order Greeks for options, value at risk (VaR), and Monte Carlo methods. The examples and implementation use up-to-date and relevant data.

Parts I to V cover corporate finance topics, bond and yield curve models, portfolio theory, options and derivatives, and Monte Carlo methods and their implementation in finance. Parts VI and VII treat technical topics, with part VI covering Excel and R issues and part VII (now on the book's auxiliary website) covering Excel's programming language, Visual Basic for Applications (VBA), and Python implementations. Knowledge of technical chapters on VBA and R is not necessary for understanding the material in the first five parts. The book is suitable for use in advanced finance classes that emphasize the need to combine modeling skills with a deeper knowledge of the underlying financial models.

The late **Simon Benninga** was Professor of Finance and Director of the Sofaer International MBA program at the Faculty of Management at Tel-Aviv University. For many years he was a Visiting Professor at the Wharton School of the University of Pennsylvania. **Tal Mofkadi** is Professor in the School of Finance in the Faculty of Management at Tel Aviv University, University of Amsterdam, and Nagoya University of Business and Commerce, and the managing partner of Numerics, a financial consultancy firm.

"*Financial Modeling* demonstrates how Excel and other computational tools facilitate complex problem-solving. The fifth edition clarifies the exposition of some earlier material and adds R and Python to the toolkit. It's a must-have for finance students, scholars, and modeling professionals."

—Robert A. Taggart, Professor Emeritus, Finance, Carroll School of Management, Boston College

University Chemistry

Frontiers and Foundations from a Global and Molecular Perspective

James G. Anderson

A new approach to teaching university-level chemistry that links core concepts of chemistry and physical science to current global challenges.

Introductory chemistry and physics are generally taught at the university level as isolated subjects, divorced from any compelling context. Moreover, the "formalism first" teaching approach presents students with disembodied knowledge, abstract and learned by rote. By contrast, this textbook presents a new approach to teaching university-level chemistry that links core concepts of chemistry and physical science to current global challenges. It provides the rigorous development of the principles of chemistry but places these core concepts in a global context to engage developments in technology, energy production and distribution, the irreversible nature of climate change, and national security.

Each chapter opens with a "Framework" section that establishes the topic's connection to emerging challenges. Next, the "Core" section addresses concepts including the first and second law of thermodynamics, entropy, Gibbs free energy, equilibria, acid-base reactions, electrochemistry, quantum mechanics, molecular bonding, kinetics, and nuclear. Finally, the "Case Studies" section explicitly links the scientific principles to an array of global issues. These case studies are designed to build quantitative reasoning skills, supply the technology background, and illustrate the critical global need for the infusion of technology into energy generation. The text's rigorous development of both context and scientific principles equips students for advanced classes as well as future involvement in scientific and societal arenas.
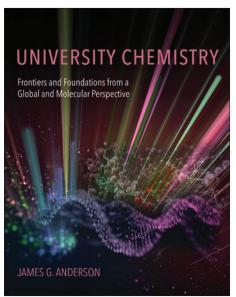
University Chemistry was written for a widely adopted course created and taught by the author at Harvard.
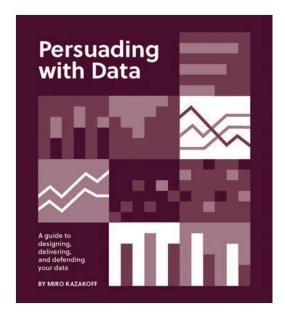
James G. Anderson, recipient of the 2021 Dreyfus Prize in Environmental Chemistry, is Philip Weld Professor in the Departments of Chemistry and Chemical Biology, Earth and Planetary Sciences, and the School of Engineering and Applied Sciences at Harvard University.

Persuading with Data

A Guide to Designing, Delivering, and Defending Your Data

Miro Kazakoff

An integrated introduction to data visualization, strategic communication, and delivery best practices.

Persuading with Data provides an integrated instructional guide to data visualization, strategic communication, and delivery best practices. Most books on data visualization focus on creating good graphs. This is the first book that combines both explanatory visualization and communication strategy, showing how to use visuals to create effective communications that convince an audience to accept and act on the data. In four parts that proceed from micro to macro, the book explains how our brains make sense of graphs; how to design effective graphs and slides that support your ideas; how to organize those ideas into a compelling presentation; and how to deliver and defend data to an audience.

Persuading with Data is for anyone who has to explain analytical results to others. It synthesizes a wide range of skills needed by modern data professionals, providing a complete toolkit for creating effective business communications. Readers will learn how to simplify in order to amplify, how to communicate data analysis, how to prepare for audience resistance, and much more. The book integrates practitioner and academic perspectives with real-world examples from a variety of industries, organizations, and disciplines. It is accessible to a wide range of readers—from undergraduates to mid-career and executive-level professionals—and has been tested in settings that include academic classes and workplace training sessions.

Miro Kazakoff is Senior Lecturer in Managerial Communication at MIT Sloan School of Management.

Introduction to Modeling Cognitive Processes

Tom Verguts

An introduction to computational modeling for cognitive neuroscientists, covering both foundational work and recent developments.

Cognitive neuroscientists need sophisticated conceptual tools to make sense of their field's proliferation of novel theories, methods, and data. Computational modeling is such a tool, enabling researchers to turn theories into precise formulations. This book offers a mathematically gentle and theoretically unified introduction to modeling cognitive processes. Theoretical exercises of varying degrees of difficulty throughout help readers develop their modeling skills.

After a general introduction to cognitive modeling and optimization, the book covers models of decision making; supervised learning algorithms, including Hebbian learning, delta rule, and backpropagation; the statistical model analysis methods of model parameter estimation and model evaluation; the three recent cognitive modeling approaches of reinforcement learning, unsupervised learning, and Bayesian models; and models of social interaction. All mathematical concepts are introduced gradually, with no background in advanced topics required. Hints and solutions for exercises and a glossary follow the main text. All code in the book is Python, with the Spyder editor in the Anaconda environment. A GitHub repository with Python files enables readers to access the computer code used and start programming themselves. The book is suitable as an introduction to modeling cognitive processes for students across a range of disciplines and as a reference for researchers interested in a broad overview.
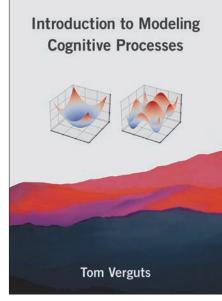
Tom Verguts is Professor in the Department of Experimental Psychology at Ghent University.

"Neurocognitive modeling spans many levels of analysis, from neurons to cognitive function. Verguts presents an exceptionally lucid overview of theoretical and methodological approaches in this field that will be an amazing resource for students at all levels."

—Michael J. Frank, Edgar L. Marston Professor and Director of the Carney Center for Computational Brain Science, Brown University; coauthor of *Computational Cognitive Neuroscience*
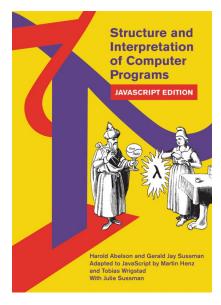
Structure and Interpretation of Computer Programs
JavaScript edition

Harold Abelson and Gerald Jay Sussman

adapted for JavaScript by Martin Henz and Tobias Wrigstad

with Julie Sussman

A new version of the classic and widely used text adapted for the JavaScript programming language.

Since the publication of its first edition in 1984 and its second edition in 1996, *Structure and Interpretation of Computer Programs* (*SICP*) has influenced computer science curricula around the world. Widely adopted as a textbook, the book has its origins in a popular entry-level computer science course taught by Harold Abelson and Gerald Jay Sussman at MIT. *SICP* introduces the reader to central ideas of computation by establishing a series of mental models for computation. Earlier editions used the programming language Scheme in their program examples. This new version of the second edition has been adapted for JavaScript.

The first three chapters of *SICP* cover programming concepts that are common to all modern high-level programming languages. Chapters four and five, which used Scheme to formulate language processors for Scheme, required significant revision. Chapter four offers new material, in particular an introduction to the notion of program parsing. The evaluator and compiler in chapter five introduce a subtle stack discipline to support return statements (a prominent feature of statement-oriented languages) without sacrificing tail recursion.

The JavaScript programs included in the book run in any implementation of the language that complies with the ECMAScript 2020 specification, using the JavaScript package sicp provided by the MIT Press website.

Harold Abelson is Class of 1922 Professor of Computer Science and Engineering at MIT. **Gerald Jay Sussman** is Panasonic Professor of Electrical Engineering at MIT. **Martin Henz** is Associate Professor of Computer Science at the National University of Singapore. **Tobias Wrigstad** is Professor of Computer Science at Uppsala University.
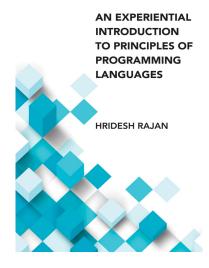
An Experiential Introduction to Principles of Programming Languages

Hridesh Rajan

A textbook that uses a hands-on approach to teach principles of programming languages, with Java as the implementation language.

This introductory textbook teaches the principles of programming languages by using an experiential learning style, in which students learn about language features by realizing those features in a pedagogical compiler. Students use Java—the most commonly used programming language in the first two years of the computer science curriculum—as the implementation language throughout. The book also discusses a range of emerging topics in programming languages missing from existing textbooks, including concurrency, Big Data, and event-driven programming. The goal is to prepare students to design, implement, analyze, and understand both domain-specific and general-purpose programming languages.

The book first develops basic concepts in languages, including means of computation using primitive values, means of combination such as variable definition and functions, and means of abstraction such as functions and recursive functions. It then examines imperative features such as references, concurrency features such as fork, and reactive features such as event handling. Finally, it looks at language features that express important, and often different, perspectives of thinking about computation, including those of logic programming and flow-based programming. Each chapter is associated with a working implementation of a small programming language, and students are encouraged to obtain the code corresponding to the chapters and follow along. Students should have experience in programming with Java as well as an understanding of object-oriented classes, inheritance, polymorphism, and static classes.

Hridesh Rajan is Kingland Professor and Chair in the Department of Computer Science at Iowa State University. He has held visiting positions at the University of Bristol, Harvard University, and the University of Texas. He is a Fellow of the AAAS and a distinguished member of the ACM.

Computational Imaging

Ayush Bhandari, Achuta Kadambi, and Ramesh Raskar

A comprehensive and up-to-date textbook and reference for computational imaging, which combines vision, graphics, signal processing, and optics.

Computational imaging involves the joint design of imaging hardware and computer algorithms to create novel imaging systems with unprecedented capabilities. In recent years such capabilities include cameras that operate at a trillion frames per second, microscopes that can see small viruses long thought to be optically irresolvable, and telescopes that capture images of black holes. This text offers a comprehensive and up-to-date introduction to this rapidly growing field, a convergence of vision, graphics, signal processing, and optics. It can be used as an instructional resource for computer imaging courses and as a reference for professionals. It covers the fundamentals of the field, current research and applications, and light transport techniques.

The text first presents an imaging toolkit, including optics, image sensors, and illumination, and a computational toolkit, introducing modeling, mathematical tools, model-based inversion, data-driven inversion techniques, and hybrid inversion techniques. It then examines different modalities of light, focusing on the plenoptic function, which describes degrees of freedom of a light ray. Finally, the text outlines light transport techniques, describing imaging systems that obtain micron-scale 3D shape or optimize for noise-free imaging, optical computing, and non-line-of-sight imaging. Throughout, it discusses the use of computational imaging methods in a range of application areas, including smart phone photography, autonomous driving, and medical imaging. End-of-chapter exercises help put the material in context.

Ayush Bhandari is Assistant Professor of Electrical and Electronic Engineering at Imperial College London. **Achuta Kadambi** is Assistant Professor of Electrical Engineering and Computer Science at the University of California, Los Angeles. **Ramesh Raskar** is Associate Professor at the MIT Media Lab and winner of the 2016 Lemelson-MIT Prize.

Mathematics for Economics

fourth edition

Michael Hoy, John Livernois, Chris McKenna, Ray Rees, and Thanasis Stengos

An updated edition of a widely used textbook, offering a clear and comprehensive presentation of mathematics for undergraduate economics students.

This text offers a clear and comprehensive presentation of the mathematics required to tackle problems in economic analyses, providing not only straightforward exposition of mathematical methods for economics students at the intermediate and advanced undergraduate levels but also a large collection of problem sets. This updated and expanded fourth edition contains numerous worked examples drawn from a range of important areas, including economic theory, environmental economics, financial economics, public economics, industrial organization, and the history of economic thought. These help students develop modeling skills by showing how the same basic mathematical methods can be applied to a variety of interesting and important issues.

The five parts of the text cover fundamentals, calculus, linear algebra, optimization, and dynamics. The only prerequisite is high school algebra; the book presents all the mathematics needed for undergraduate economics. New to this edition are "Reader Assignments," short questions designed to test students' understanding before they move on to the next concept. The book's website offers additional material, including more worked examples (as well as examples from the previous edition). Separate solutions manuals for students and instructors are also available.

Michael Hoy is Professor in the Department of Economics and Finance at the University of Guelph. **John Livernois** is Professor in the Department of Economics at the University of Guelph. **Chris McKenna** is former Professor in the Department of Economics and Finance at the University of Guelph. **Ray Rees** is Professor of Economics Emeritus at the Center for Economic Studies (CES) at the University of Munich. **Thanasis Stengos** is Professor in the Department of Economics and Finance at the University of Guelph.

economics

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Student Solutions Manual for *Mathematics for Economics*

fourth edition

Michael Hoy, John Livernois, Chris McKenna, Ray Rees, and Thanasis Stengos
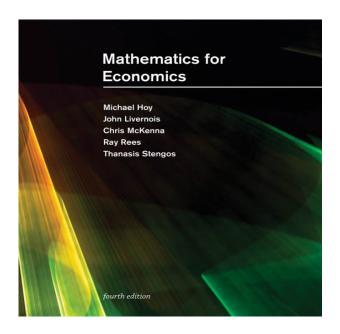
This student solutions manual contains solutions to odd-numbered exercises in the fourth edition of *Mathematics for Economics*.
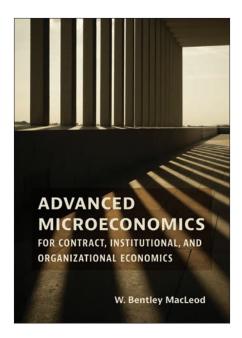
economics

April | 8 1/2 x 11, 168 pp.

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Advanced Microeconomics for Contract, Institutional, and Organizational Economics

W. Bentley MacLeod

A graduate textbook on microeconomics, covering decision theory, game theory, and the foundations of contract theory, with a unique focus on the empirical.

This graduate-level text on microeconomics, covering such topics as decision theory, game theory, bargaining theory, contract theory, trade under asymmetric information, and relational contract theory, is unique in its emphasis on the interplay between theory and evidence. It reviews the microeconomic theory of exchange "from the ground up," aiming to produce a set of models and hypotheses amenable to empirical exploration, with particular focus on models that are useful for the study of contracts, institutions, and organizations. It explores research that extends price theory to the exchange of commodities when markets are incomplete, discussing recent developments in the field.

Topics covered include the relationship between theory and evidence; decision theory as it is used in contract theory and institutional design; game theory; axiomatic and strategic bargaining theory; agency theory and the class of models that are considered to constitute contract theory, with discussions of moral hazard and trade with asymmetric information; and the theory of relational contracts. The final chapter offers a nontechnical review that provides a guide to which model is the most appropriate for a particular application. End-of-chapter exercises help students expand their understanding of the material, and an appendix provides a brief introduction to optimization theory and the welfare theorem of general equilibrium theory. Students are assumed to be familiar with general equilibrium theory and basic constrained optimization theory.

W. Bentley MacLeod is Sami Mnaymneh Professor of Economics, Professor of International and Public Affairs, and Affiliated Law Faculty at Columbia University.

Torts!

third edition

Jonathan L. Zittrain and Jordi Weinstock

A law school casebook that maps the progression of the law of torts through the language and example of public judicial decisions in a range of cases.

A tort is a wrong that a court is prepared to recognize, usually in the form of ordering the transfer of money ("damages") from the wrongdoer to the wronged. The tort system offers recourse for people aggrieved and harmed by the actions of others. By filing a lawsuit, private citizens can demand the attention of alleged wrongdoers to account for what they've done—and of a judge and jury to weigh the claims and set terms of compensation. This book, which can be used as a primary text for a first-year law school torts course, maps the progression of the law of torts through the language and example of public judicial decisions in a range of cases. Taken together, these cases show differing approaches to the problems of defining legal harm and applying those definitions to a messy world.

The cases range from alleged assault and battery by "The Schoolboy Kicker" (1891) to the liability of General Motors for "The Crumpling Toe Plate" (1993). Each case is an artifact of its time; students can compare the judges' societal perceptions and moral compasses to those of the current era.

This book is part of the Open Casebook series from Harvard Law School Library and the MIT Press.

Jonathan L. Zittrain is George Bemis Professor of International Law at Harvard Law School and Harvard Kennedy School of Government. He is also Professor of Computer Science at the Harvard School of Engineering and Applied Sciences, Director of the Harvard Law School Library, and Cofounder and Director of Harvard's Berkman Klein Center for Internet & Society. **Jordi Weinstock** is a Lecturer on Law at Harvard Law School.
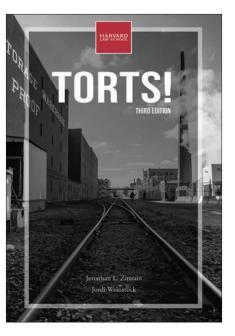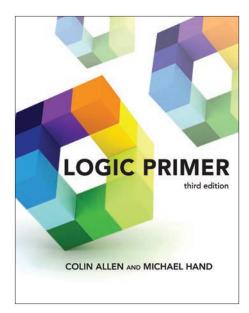
Logic Primer

third edition

Colin Allen and Michael Hand

The new edition of a comprehensive and rigorous but concise introduction to symbolic logic.

Logic Primer offers a comprehensive and rigorous introduction to symbolic logic, providing concise definitions of key concepts, illustrative examples, and exercises. After presenting the definitions of validity and soundness, the book goes on to introduce a formal language, proof theory, and formal semantics for sentential logic (chapters 1–3) and for first-order predicate logic (chapters 4–6) with identity (chapter 7). For this third edition, the material has been reorganized from four chapters into seven, increasing the modularity of the text and enabling teachers to choose alternative paths through the book. New exercises have been added, and all exercises are now arranged to support students moving from easier to harder problems.

Its spare and elegant treatment makes *Logic Primer* unique among textbooks. It presents the material with minimal chattiness, allowing students to proceed more directly from topic to topic and leaving instructors free to cover the subject matter in the way that best suits their students. The book includes more than thirty exercise sets, with answers to many of them provided in an appendix. The book's website allows students to enter and check proofs, truth tables, and other exercises interactively.

Colin Allen is Distinguished Professor in the Department of History and Philosophy of Science at the University of Pittsburgh. He is coauthor of *Species of Mind* and coeditor of *Nature's Purposes* and The *Cognitive Animal*, all published by the MIT Press. Michael Hand is Professor of Philosophy at Texas A&M University.

"I have long been a huge fan of *Logic Primer*, so it's very exciting to see it being released in a third edition. This edition retains the elegant and intuitive system developed by the authors in previous editions but introduces and presents the material in a more modularized structure, thereby making an already superb textbook more adaptable to different instructional preferences. I can't wait to use this in my classes!"

—Amy Kind, Professor of Philosophy, Claremont McKenna

"I am very pleased to see that *Logic Primer* is coming out in a third edition. I have used the previous editions to great effect in turning my classes into learning communities of careful readers. My students and I have appreciated *Logic Primer*'s clear, direct, and intelligibly sequenced presentation of material."

—William Robinson, Professor of Philosophy Emeritus, Iowa State University

Action, Mind, and Brain

An Introduction

David A. Rosenbaum

An engaging and accessible introduction to the psychology and neuroscience of physical action.

This engaging and accessible book offers the first introductory text on the psychology and neuroscience of physical action. Written by a leading researcher in the field, it covers the interplay of action, mind, and brain, showing that many core concepts in philosophy, psychology, neuroscience, and technology grew out of questions about the control of everyday physical actions. It explains action not as a "one-way street from stimuli to response" but as a continual action-perception cycle. The informal writing style invites students to think through the evidence step by step, helping them develop general thinking stills as well as learn specific facts. Special emphasis is placed on the role of underrepresented groups.

The book discusses the intellectual background of the field, from Plato to Kant, Dewey, and others; applications and methods; and the physical substrates of action—bones, tendons, ligaments, muscles, and nerves. It considers the control of actions in space; learning, and the roles of nature and nurture; feedback; feedforward, or anticipated feedback; and degrees of freedom—the multiple ways of getting things done and three methods for narrowing the alternatives. The book is generously illustrated, including many images of thinkers who contributed to the field.
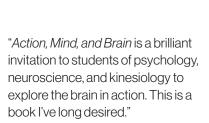
David A. Rosenbaum is Distinguished Professor in the Department of Psychology at the University of California, Riverside. He is the author of *Human Motor Control, It's a Jungle in There: How Competition and Cooperation in the Brain Shape the Mind, Knowing Hands: The Cognitive Psychology of Manual Control*, and other books.

psychology

February | 7 x 10, 302 pp. | 115 illus.

US $55.00X / $73.00 CAN paper
978-0-262-54339-2

"*Action, Mind, and Brain* is a brilliant invitation to students of psychology, neuroscience, and kinesiology to explore the brain in action. This is a book I've long desired."
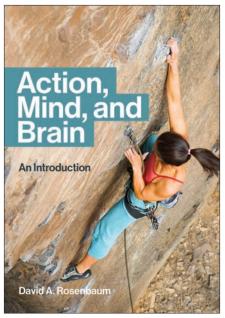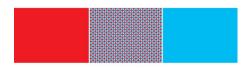
—Romeo Chua, Professor, School of Kinesiology, University of British Columbia

"David Rosenbaum's richly illustrated book is an exceptionally engaging, educational, and encompassing primer to brain, cognition, and behavior. It uniquely introduces students to the history, philosophy, methods, and measures of the science of human action."

—Edward Wasserman, Stuit Professor of Experimental Psychology, University of Iowa; author of *As If by Design: How Creative Behaviors Really Evolve*

Mastering Quantum Mechanics

Essentials, Theory, and Applications

Barton Zwiebach

A complete overview of quantum mechanics, covering essential concepts and results, theoretical foundations, and applications.

This undergraduate textbook offers a comprehensive overview of quantum mechanics, beginning with essential concepts and results, proceeding through the theoretical foundations that provide the field's conceptual framework, and concluding with the tools and applications students will need for advanced studies and for research. Drawn from lectures created for MIT undergraduates and for the popular MITx online course, "Mastering Quantum Mechanics," the text presents the material in a modern and approachable manner while still including the traditional topics necessary for a well-rounded understanding of the subject. As the book progresses, the treatment gradually increases in difficulty, matching students' increasingly sophisticated understanding of the material.

Part 1, on essentials, offers a sound introduction to the subject, touching on such topics as states and probability amplitudes, the Schrodinger equation, energy eigenstates of particles in potentials, the hydrogen atom, and spin one-half particles. Part 2, on theoretical foundations, covers mathematical tools, the pictures of quantum mechanics and the axioms of quantum mechanics, entanglement and tensor products, angular momentum, and identical particles. Part 3, on applications, introduces tools and techniques that help students master the theoretical concepts with a focus on approximation methods. About 240 exercises appear throughout the text, and nearly 300 end-of-chapter problems support the understanding of the subject. After mastering the material in this book, students will have the strong foundation in quantum mechanics that is required for graduate work in physics.

Barton Zwiebach is Professor of Physics at MIT. His research is in theoretical particle physics and string theory, and he is the author of the undergraduate textbook *A First Course in String Theory*. The creator and lead instructor for the popular MITx "Mastering Quantum Mechanics" course, he taught undergraduate quantum mechanics at MIT from 2010 to 2020.

Human-Centered Data Science

An Introduction

Cecilia Aragon, Shion Guha, Marina Kogan, Michael Muller, and Gina Neff

Best practices for addressing the bias and inequality that may result from the automated collection, analysis, and distribution of large datasets.

Human-centered data science is a new interdisciplinary field that draws from human-computer interaction, social science, statistics, and computational techniques. This book, written by founders of the field, introduces best practices for addressing the bias and inequality that may result from the automated collection, analysis, and distribution of very large datasets. It offers a brief and accessible overview of many common statistical and algorithmic data science techniques, explains human-centered approaches to data science problems, and presents practical guidelines and real-world case studies to help readers apply these methods.

The authors explain how data scientists' choices are involved at every stage of the data science workflow—and show how a human-centered approach can enhance each one, by making the process more transparent, asking questions, and considering the social context of the data. They describe how tools from social science might be incorporated into data science practices, discuss different types of collaboration, and consider data storytelling through visualization. The book shows that data science practitioners can build rigorous and ethical algorithms and design projects that use cutting-edge computational tools and address social concerns.
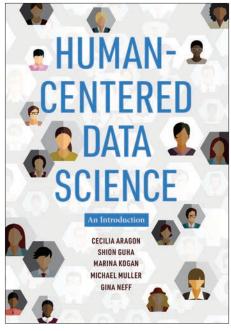
Cecilia Aragon is Professor in the Department of Human Centered Design and Engineering at the University of Washington. **Shion Guha** is Assistant Professor in the Faculty of Information at the University of Toronto. **Marina Kogan** is Assistant Professor in the School of Computing at the University of Utah. **Michael Muller** is a Research staff member at IBM Research. **Gina Neff** is Professor of Technology and Society at the Oxford Internet Institute and the Department of Sociology at the University of Oxford.

"We cannot engage in data science that doesn't account for power. Histories and systems of race and gender must be taught to data scientists, because we know terrible wrongs can occur in the making and use of data. This book is a must-read to expose the next generation of data scientists to the consequences of their work."

—Safiya Umoja Noble, author of *Algorithms of Oppression*

The Individual in the Animal Kingdom

Julian S. Huxley

foreword by Richard Gawne and Jacobus Boomsma

The groundbreaking first book by a major evolutionary biologist, published in 1912, that anticipated current thinking about organismal complexity.

Julian Huxley's *The Individual in the Animal Kingdom*, published in 1912, is a concise and groundbreaking work that is almost entirely unknown today. In it, Huxley analyzes the evolutionary advances in life's organizational complexity, anticipating many of today's ideas about changes in individuality. Huxley's overarching system of concepts and his coherent logical principles were so far ahead of their time that they remain valid to this day. In part, this is because his explicitly Darwinian approach carefully distinguished between the integrated form and function of hierarchies within organisms and loosely defined, nonorganismal ecological communities.

In *The Individual in the Animal Kingdom*, we meet a youthful Huxley who uses his commanding knowledge of natural history to develop a nonreductionist account of life's complexity that aligns with seminal early insights by Darwin, Wallace, Weismann, and Wheeler. As volume editors Richard Gawne and Jacobus Boomsma point out, this work disappeared into oblivion despite its relevance for contemporary research on organismal complexity and major evolutionary transitions. This MIT Press edition gives Huxley's book a second hearing, offering readers a unique vantage point on the discoveries of evolutionary biology past and present.

Julian Huxley (1887–1975), an English evolutionary biologist, was a prolific author and a leading figure in the mid-twentieth century effort to consolidate the modern synthesis of evolutionary theory. **Richard Gawne** is Postdoctoral Fellow at the Allen Discovery Center at Tufts University and coeditor of *The Convergent Evolution of Agriculture in Humans and Insects* (MIT Press). **Jacobus Boomsma** is Professor of Ecology and Evolution at the University of Copenhagen.

science | biology

March | 5 1/4 x 8, 184 pp. | 18 illus.

US $25.00X/$34.00 CAN cloth
978-0-262-04537-7

The Convergent Evolution of Agriculture in Humans and Insects

edited by Ted R. Schultz, Richard Gawne, and Peter N. Peregrine

Contributors explore common elements in the evolutionary histories of both human and insect agriculture resulting from convergent evolution.

During the past 12,000 years, agriculture originated in humans as many as twenty-three times, and during the past 65 million years, agriculture also originated in nonhuman animals at least twenty times and in insects at least fifteen times. It is much more likely that these independent origins represent similar solutions to the challenge of growing food than that they are due purely to chance. This volume seeks to identify common elements in the evolutionary histories of both human and insect agriculture that are the results of convergent evolution. The goal is to create a new, synthetic field that characterizes, quantifies, and empirically documents the evolutionary and ecological mechanisms that drive both human and nonhuman agriculture.

The contributors report on the results of quantitative analyses comparing human and nonhuman agriculture; discuss evolutionary conflicts of interest between and among farmers and cultivars and how they interfere with efficiencies of agricultural symbiosis; describe in detail agriculture in termites, ambrosia beetles, and ants; and consider patterns of evolutionary convergence in different aspects of agriculture, comparing fungal parasites of ant agriculture with fungal parasites of human agriculture, analyzing the effects of agriculture on human anatomy, and tracing the similarities and differences between the evolution of agriculture in humans and in a single, relatively well-studied insect group, fungus-farming ants.

Ted R. Schultz is Research Entomologist at the Smithsonian Institution. **Richard Gawne** is Postdoctoral Fellow at the Allen Discovery Center at Tufts University. **Peter N. Peregrine** is Professor of Anthropology and Museum Studies at Lawrence University.

science | biology

February | 7 x 10, 338 pp. | 54 illus.

US $75.00X/$99.00 CAN paper
978-0-262-54320-0

Vienna Series in Theoretical Biology

Global Fintech

Financial Innovation in the Connected World

David L. Shrier and Alex Pentland

How the global financial services sector has been transformed by artificial intelligence, data science, and blockchain.

Artificial intelligence, big data, blockchain, and other new technologies have upended the global financial services sector, creating opportunities for entrepreneurs and corporate innovators. Venture capitalists have helped to fund this disruption, pouring nearly $500 billion into fintech over the last five years. This book offers global perspectives on technology-fueled transformations in financial services, with contributions from a wide-ranging group of academics, industry professionals, former government officials, and current government advisors. They examine not only the struggles of rich countries to bring the old analog world into the new digital one but also the opportunities for developing countries to "leapfrog" directly into digital.

The book offers accessible explanations of blockchain and distributed ledger technology and explores big data analytics. It considers, among other things, open banking, platform-based strategies for banks, and digital financial services. Case studies imagine possible future fintech-government interaction, emphasizing that legal and regulatory frameworks can help to create trust in financial processes. The contributors offer novel takes and unexpected insights that will be of interest to fintech experts and nonexperts alike.

David L. Shrier is a Professor of Practice (AI and Innovation) with Imperial College Business School. He is coeditor of *New Solutions for Cybersecurity* (MIT Press). **Alex "Sandy" Pentland** directs the MIT-wide initiative MIT Connection Science. Called one of the "seven most powerful data scientists in the world" by *Forbes*, he has cofounded more than a dozen companies and is the author of *Social Physics* and coauthor of *Building the New Economy* (MIT Press).

business | management

March | 5 1/4 x 8, 320 pp. | 11 illus.

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MIT Connection Science & Engineering

Active Inference

The Free Energy Principle in Mind, Brain, and Behavior

Thomas Parr, Giovanni Pezzulo, and Karl J. Friston

The first comprehensive treatment of active inference, an integrative perspective on brain, cognition, and behavior used across multiple disciplines.

Active inference is a way of understanding sentient behavior—a theory that characterizes perception, planning, and action in terms of probabilistic inference. Developed by theoretical neuroscientist Karl Friston over years of groundbreaking research, active inference provides an integrated perspective on brain, cognition, and behavior that is increasingly used across multiple disciplines including neuroscience, psychology, and philosophy. Active inference puts the action into perception. This book offers the first comprehensive treatment of active inference, covering theory, applications, and cognitive domains.

Active inference is a "first principles" approach to understanding behavior and the brain, framed in terms of a single imperative to minimize free energy. The book emphasizes the implications of the free energy principle for understanding how the brain works. It first introduces active inference both conceptually and formally, contextualizing it within current theories of cognition. It then provides specific examples of computational models that use active inference to explain such cognitive phenomena as perception, attention, memory, and planning.

Thomas Parr is a Postdoctoral Scholar at the Wellcome Centre for Human Neuroimaging at the Queen Square Institute of Neurology at University College London and a practicing clinician. **Giovanni Pezzulo** is a Researcher at the Institute of Cognitive Sciences and Technologies of the National Research Council of Italy in Rome. **Karl J. Friston** is Scientific Director of the Wellcome Centre for Human Neuroimaging and Professor at Queen Square Institute of Neurology at University College London.

cognitive science | neuroscience

March | 6 x 9, 312 pp. | 58 illus.

US $40.00X/$54.00 CAN cloth
978-0-262-04535-3

The Secret Life of Literature

Lisa Zunshine

An innovative account that brings together cognitive science, ethnography, and literary history to examine patterns of "mindreading" in a wide range of literary works.

For over four thousand years, writers have been experimenting with what cognitive scientists call "mind-reading": constantly devising new social contexts for making their audiences imagine complex mental states of characters and narrators. In *The Secret Life of Literature*, Lisa Zunshine uncovers these mindreading patterns, which have, until now, remained invisible to both readers and critics, in works ranging from *The Epic of Gilgamesh* to *Invisible Man*. Bringing together cognitive science, ethnography, and literary studies, this engaging book transforms our understanding of literary history.

Central to Zunshine's argument is the exploration of mental states "embedded" within each other, as, for instance, when Ellison's *Invisible Man* is aware of how his white Communist Party comrades pretend not to understand what he means, when they want to reassert their position of power. Paying special attention to how race, class, and gender inform literary embedments, Zunshine contrasts this dynamic with real-life patterns studied by cognitive and social psychologists. She also considers community-specific mindreading values and looks at the rise and migration of embedment patterns across genres and national literary traditions, noting particularly the use of deception, eavesdropping, and shame as plot devices. Finally, she investigates mindreading in children's literature. Stories for children geared toward different stages of development, she shows, provide cultural scaffolding for initiating young readers into a long-term engagement with the secret life of literature.

Lisa Zunshine is Bush-Holbrook Professor of English at the University of Kentucky, a Guggenheim Fellow, and the author of *Why We Read Fiction*, *Strange Concepts and the Stories They Make Possible*, and *Getting Inside Our Head*.

cognitive science

March | 6 x 9, 320 pp. | 4 illus.

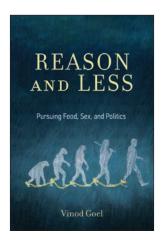**US $40.00X/$54.00 CAN cloth**
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Reason and Less

Pursuing Food, Sex, and Politics

Vinod Goel

A new, biologically driven model of human behavior in which reason is tethered to the evolutionarily older autonomic, instinctive, and associative systems.

In *Reason and Less*, Vinod Goel explains the workings of the tethered mind. Reason does not float on top of our biology but is tethered to evolutionarily older autonomic, instinctive, and associative systems. After describing the conceptual and neuroanatomical basis of each system, Goel shows how they interact to generate a blended response. Goel's common sense account drives human behavior back into the biology, where it belongs, and provides a richer set of tools for understanding how we pursue food, sex, and politics.

Goel takes the reader on a journey through psychology (cognitive, behavioral, developmental, and evolutionary), neuroscience, philosophy, ethology, economics, and political science to explain the workings of the tethered mind. One key insight that holds everything together is that feelings—generated in old, widely conserved brain stem structures—are evolution's solution to initiating and selecting all behaviors, and provide the common currency for the different systems to interact. Reason is as much about feelings as are lust and the taste of chocolate cake. All systems contribute to behavior and the overall control structure is one that maximizes pleasure and minimizes displeasure.

Tethered rationality has some sobering and challenging implications for such real-world human behaviors as climate change denial, Trumpism, racism, or sexism. They cannot be changed simply by targeting beliefs but will require more drastic measures, the nature of which depends on the specific behavior in question. Having an accurate model of human behavior is the crucial first step.

Vinod Goel is Professor of Cognitive Neuroscience at York University in Toronto and the author of *Sketches of Thought* (MIT Press).

cognitive sciences

February | 6 x 9 x 1, 440 pp.

US $45.00X/$60.00 CAN paper
978-0-262-04547-6

Cognitive Robotics

edited by Angelo Cangelosi and Minoru Asada

The current state of the art in cognitive robotics, covering the challenges of building AI-powered intelligent robots inspired by natural cognitive systems.

A novel approach to building AI-powered intelligent robots takes inspiration from the way natural cognitive systems—in humans, animals, and biological systems—develop intelligence by exploiting the full power of interactions between body and brain, the physical and social environment in which they live, and phylogenetic, developmental, and learning dynamics. This volume reports on the current state of the art in cognitive robotics, offering the first comprehensive coverage of building robots inspired by natural cognitive systems.

Contributors first provide a systematic definition of cognitive robotics and a history of developments in the field. They describe in detail five main approaches: developmental, neuro, evolutionary, swarm, and soft robotics. They go on to consider methodologies and concepts, treating topics that include commonly used cognitive robotics platforms and robot simulators, biomimetic skin as an example of a hardware-based approach, machine-learning methods, and cognitive architecture. Finally, they cover the behavioral and cognitive capabilities of a variety of models, experiments, and applications, looking at issues that range from intrinsic motivation and perception to robot consciousness.

Cognitive Robotics is aimed at an interdisciplinary audience, balancing technical details and examples for the computational reader with theoretical and experimental findings for the empirical scientist.

Angelo Cangelosi is Professor of Machine Learning and Robotics at the University of Manchester, UK, and coauthor of *Developmental Robotics* (MIT Press). **Minoru Asada** is Specially Appointed Professor in the Institute for Open and Transdisciplinary Research Initiatives at Osaka University.

computer science

May | 7 x 10, 672 pp. | 127 illus

US $120.00X / $157.00 CAN cloth
978-0-262-04683-1

Intelligent Robotics and Autonomous Agents series

High-Performance Big Data Computing

Dhabaleswar K. Panda, Xiaoyi Lu, and Dipti Shankar

An in-depth overview of an emerging field that brings together high-performance computing, big data processing, and deep learning.

Over the last decade, the exponential explosion of data known as big data has changed the way we understand and harness the power of data. The emerging field of high-performance big data computing, which brings together high-performance computing (HPC), big data processing, and deep learning, aims to meet the challenges posed by large-scale data processing. This book offers an in-depth overview of high-performance big data computing and the associated technical issues, approaches, and solutions.

The book covers basic concepts and necessary background knowledge, including data processing frameworks, storage systems, and hardware capabilities; offers a detailed discussion of technical issues in accelerating big data computing in terms of computation, communication, memory and storage, codesign, workload characterization and benchmarking, and system deployment and management; and surveys benchmarks and workloads for evaluating big data middleware systems. It presents a detailed discussion of big data computing systems and applications with high-performance networking, computing, and storage technologies, including state-of-the-art designs for data processing and storage systems. Finally, the book considers some advanced research topics in high-performance big data computing, including designing high-performance deep learning over big data (DLoBD) stacks and HPC cloud technologies.

Dhabaleswar K. Panda is Professor and University Distinguished Scholar of Computer Science and Engineering at the Ohio State University. **Xiaoyi Lu** is an Assistant Professor in the Department of Computer Science and Engineering at the University of California, Merced. **Dipti Shankar** is currently working at SAP, Germany.

computer science

June | 7 x 9, 288 pp.

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Scientific and Engineering Computation series

Sex Dolls at Sea

Imagined Histories of Sexual Technologies

Bo Ruberg

Investigating and reimagining the origin story of the sex doll through the tale of the sailor's *dames de voyage*.

The sex doll and its high-tech counterpart the sex robot have gone mainstream, as both the object of consumer desire and the subject of academic study. But sex dolls, and sexual technology in general, are nothing new. Sex dolls have been around for centuries. In *Sex Dolls at Sea*, Bo Ruberg explores the origin story of the sex doll, investigating its cultural implications and considering who has been marginalized and who has been privileged in the narrative.

Ruberg examines the generally accepted story that the first sex dolls were *dames de voyage*, rudimentary figures made of cloth and leather scraps by European sailors on long, lonely ocean voyages in centuries past. In search of supporting evidence for the lonesome sailor sex doll theory, Ruberg uncovers the real history of the sex doll. The earliest commercial sex dolls were not the *dames de voyage* but the *femmes en caoutchouc*: "women" made of inflatable vulcanized rubber, beginning in the late nineteenth century.

Interrogating the sailor sex doll origin story, Ruberg finds beneath the surface a web of issues relating to gender, sexuality, race, and colonialism. What has been lost in the history of the sex doll and other sex tech, Ruberg tells us, are the stories of the sex workers, women, queer people, and people of color whose lives have been bound up with these technologies.

Bo Ruberg is Associate Professor in the Department of Film and Media Studies at the University of California, Irvine, and the author of *The Queer Games Avant-Garde* and *Video Games Have Always Been Queer*.

cultural studies | technology

June | 6 x 9, 296 pp. | 40 photos

US $30.00X / $40.00 CAN paper
978-0-262-54367-5

Media Origins series

Embodying Design

An Applied Science of Radical Embodied Cognition

Christopher Baber

Rethinking design through the lens of embodied cognition provides a novel way of understanding human interaction with technology.

In this book, Christopher Baber uses embodied cognition as a lens through which to view both how designers engage in creative practices and how people use designed artifacts. This view of cognition as enactive, embedded, situated, or distributed, without recourse to internal representations, provides a theoretical grounding that makes possible a richer account of human interaction with technology. This understanding of everyday interactions with things in the world reveals opportunities for design to intervene. Moreover, Baber argues, design is an embodied activity in which the continual engagement between designers and their materials is at the heart of design practice.

Baber proposes that design and creativity should be considered in dynamic, rather than discrete, terms and explores "task ecologies"—the concept of environment as it relates to embodied cognition. He uses a theory of affordance as an essential premise for design practice, arguing that affordances are neither form nor function but arise from the dynamics within the human-artifact-environment system. Baber explores agency and intent of smart devices and implications of tangible user interfaces and activity recognition for human-computer interaction. He proposes a systems view of human-artifact-environment interactions—to focus on any one component or pairing misses the subtleties of these interactions. The boundaries between components remain, but the borders that allow exchange of information and action are permeable, which gives rise to synergies and interactions.

Christopher Baber is Chair of Pervasive and Ubiquitous Computing in the School of Computer Science at the University of Birmingham.

design | technology

March | 6 x 9, 216 pp. | 24 illus.

US $40.00X / $54.00 CAN paper
978-0-262-54378-1

Bounded Rationality

Heuristics, Judgment, and Public Policy

Sanjit Dhami and Cass R. Sunstein

Two leaders in the field explore the foundations of bounded rationality and its effects on choices by individuals, firms, and the government.

Bounded rationality recognizes that human behavior departs from the perfect rationality assumed by neoclassical economics. In this book, Sanjit Dhami and Cass Sunstein explore the foundations of bounded rationality and consider the implications of this approach for public policy and law, in particular for questions about choice, welfare, and freedom. The authors, both recognized as experts in the field, cover a wide range of empirical findings and assess theoretical work that attempts to explain those findings. Their presentation is comprehensive, coherent, and lucid, with even the most technical material explained accessibly. They not only offer observations and commentary on the existing literature but also explore new insights, ideas, and connections.

After examining the traditional neoclassical framework, which they refer to as the Bayesian rationality approach (BRA), and its empirical issues, Dhami and Sunstein offer a detailed account of bounded rationality and how it can be incorporated into the social and behavioral sciences. They also discuss a set of models of heuristics-based choice and the philosophical foundations of behavioral economics. Finally, they examine libertarian paternalism and its strategies of "nudges."

Sanjit Dhami is Professor of Economics at the University of Leicester and the author of the seven-volume *The Foundations of Behavioral Economic Analysis*. **Cass R. Sunstein** is Robert Walmsley University Professor at Harvard Law School and Chair of the Technical Advisory Group on Behavioral Insights and Sciences at the World Health Organization. He is the author of *Sludge* (MIT Press), *Nudge* (with Richard H. Thaler), and other books.

Digital Work in the Planetary Market

edited by Mark Graham and Fabian Ferrari

Understanding the embedded and disembedded, material and immaterial, territorialized and deterritorialized natures of digital work.

Many jobs today can be done from anywhere. Digital technology and widespread internet connectivity allow almost anyone, anywhere, to connect to anyone else to communicate and exchange files, data, video, and audio. In other words, work can be deterritorialized at a planetary scale. This book examines the implications for both work and workers when work is commodified and traded beyond local labor markets. Going beyond the usual "world is flat" globalization discourse, contributors look at both the transformation of work itself and the wider systems, networks, and processes that enable digital work in a planetary market, offering both empirical and theoretical perspectives.

The contributors—leading scholars and experts from a range of disciplines—touch on a variety of issues, including content moderation, autonomous vehicles, and voice assistants. They first look at the new experience of work, finding that, despite its planetary connections, labor remains geographically sticky and embedded in distinct contexts. They go on to consider how planetary networks of work can be mapped and problematized, discuss the productive multiplicity and interdisciplinarity of thinking about digital work and its networks, and, finally, imagine how planetary work could be regulated.

Mark Graham is Professor of Internet Geography at the Oxford Internet Institute, and Faculty Fellow at the Alan Turing Institute. He is the editor of *Digital Economies at Global Margins* (MIT Press and IDRC). **Fabian Ferrari** is a doctoral candidate at the Oxford Internet Institute.

Financial Economics

Antonio Mele

A comprehensive reference for financial economics, balancing theoretical explanations, empirical evidence, and the practical relevance of knowledge in the field.

This volume offers a comprehensive, integrated treatment of financial economics, tracking the major milestones in the field and providing methodological tools. Doing so, it balances theoretical explanations, empirical evidence, and practical relevance. It illustrates nearly a century of theoretical advances with a vast array of models, showing how real phenomena (and, at times, market practice) have helped economists reformulate existing theories. Throughout, the book offers examples and solved problems that help readers understand the main lessons conveyed by the models analyzed. The book provides a unique and authoritative reference for the field of financial economics.

Part I offers the foundations of the field, introducing asset evaluation, information problems in asset markets and corporate finance, and methods of statistical inference. Part II explains the main empirical facts and the challenges these pose for financial economists, which include excess price volatility, market liquidity, market dysfunctionalities, and the countercyclical behavior of market volatility. Part III covers the main instruments that protect institutions against the volatilities and uncertainties of capital markets described in part II. Doing so, it relies on models that have become the market standard, and incorporates practices that emerged from the 2007–2008 financial crisis.

Antonio Mele is Professor of Finance at the Università della Svizzera Italiana, Senior Chair of the Swiss Finance Institute, and a Research Fellow at the Centre for Economic Policy Research in London.

Karl Brunner and Monetarism

edited by Thomas Moser and Marcel Savioz

foreword by Thomas J. Jordan

Economists consider the legacy of Karl Brunner's monetarism and its influence on current debates over monetary policy.

Monetarism emerged in the 1950s and 1960s as a school of economic thought that questioned certain tenets of Keynesianism. Emphasizing the monetary nature of inflation and the responsibility of central banks for price stability, monetarism held sway in the inflation-plagued 1970s, but saw its influence begin to decline in the 1980s. Although Milton Friedman is the economist most closely associated with the development of monetarism, it was Karl Brunner (1916–1989) who introduced the term into the current vocabulary of economics and shaped its meaning. In this volume, leading economists—many of them Brunner's friends and former colleagues—consider the influence of Brunner's monetarism on current debates over monetary policy.

Some contributors were participants in debates between Keynesians and monetarists; others analyze specific aspects of monetarism as theorized by Brunner and his close collaborator Allan Meltzer, or address its influence on US and European monetary policy. Others take the opportunity to examine Brunner-Meltzer monetarism through the lens of contemporary macroeconomics and monetary models. The book grows out of a symposium that marked the 100th anniversary of Brunner's birth.

Thomas Moser is Alternate Member of the Governing Board of the Swiss National Bank. **Marcel Savioz** is former Head of Research Coordination and Economic Education at the Swiss National Bank.

Contributors
Ernst Baltensperger, Michael D. Bordo, Pierrick Clerc, Alex Cukierman, Michel De Vroey, James Forder, Benjamin M. Friedman, Kevin D. Hoover, Thomas J. Jordan, David Laidler, Allan H. Meltzer, Thomas Moser, Edward Nelson, Juan Pablo Nicolini, Charles I. Plosser, Kenneth Rogoff, Marcel Savioz, Jürgen von Hagen, Stephen Williamson
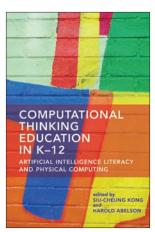
Computational Thinking Education in K–12

Artificial Intelligence Literacy and Physical Computing

edited by Siu-Cheung Kong and Harold Abelson

A guide to computational thinking education, with a focus on artificial intelligence literacy and the integration of computing and physical objects.

Computing has become an essential part of today's primary and secondary school curricula. In recent years, K–12 computer education has shifted from computer science itself to the broader perspective of computational thinking (CT), which is less about technology than a way of thinking and solving problems—"a fundamental skill for everyone, not just computer scientists," in the words of Jeanette Wing, author of a foundational article on CT. This volume introduces a variety of approaches to CT in K–12 education, offering a wide range of international perspectives that focus on artificial intelligence (AI) literacy and the integration of computing and physical objects.

The book first offers an overview of CT and its importance in K–12 education, covering such topics as the rationale for teaching CT; programming as a general problem-solving skill; and the "phenomenon-based learning" approach. It then addresses the educational implications of the explosion in AI research, discussing, among other things, the importance of teaching children to be conscientious designers and consumers of AI. Finally, the book examines the increasing influence of physical devices in CT education, considering the learning opportunities offered by robotics.

Siu-Cheung Kong is Professor of IT in Education and the Director of Centre for Learning, Teaching and Technology at the Education University of Hong Kong. **Harold Abelson** is Class of 1922 Professor of Electrical Engineering and Computer Science at MIT and Founding Director of Creative Commons, Public Knowledge, and the Free Software Foundation. He is the coauthor of the widely used textbook *Structure and Interpretation of Computer Programs* (MIT Press) and other books.

Movement Matters

How Embodied Cognition Informs Teaching and Learning

edited by Sheila L. Macrine and Jennifer M. B. Fugate

Experts translate the latest findings on embodied cognition from neuroscience, psychology, and cognitive science to inform teaching and learning pedagogy.

Embodied cognition represents a radical shift in conceptualizing cognitive processes, in which cognition develops through mind-body environmental interaction. If this supposition is correct, then the conventional style of instruction—in which students sit at desks, passively receiving information—needs rethinking. *Movement Matters* considers the educational implications of an embodied account of cognition, describing the latest research applications from neuroscience, psychology, and cognitive science and demonstrating their relevance for teaching and learning pedagogy. The contributors cover a range of content areas, explaining how the principles of embodied cognition can be applied in classroom settings.

After a discussion of the philosophical and theoretical underpinnings of embodied cognition, contributors describe its applications in language, including the areas of handwriting, vocabulary, language development, and reading comprehension; STEM areas, emphasizing finger counting and the importance of hand and body gestures in understanding physical forces; and digital learning technologies, including games and augmented reality. Finally, they explore embodied learning in the social-emotional realm, including how emotional granularity, empathy, and mindfulness benefit classroom learning.

Movement Matters introduces a new model, translational learning sciences research, for interpreting and disseminating the latest empirical findings in the burgeoning field of embodied cognition. The book provides an up-to-date, inclusive, and essential resource for those involved in educational planning, design, and pedagogical approaches.

Sheila L. Macrine is Professor in the Department of STEM Education and Teacher Development at the University of Massachusetts Dartmouth. **Jennifer M. B. Fugate** is Associate Professor of Social Cognition in the Department of Psychology at the University of Massachusetts Dartmouth.

Hidden in Plain Sight

The History, Science, and Engineering
of Microfluidic Technology

Albert Folch

**Stories behind essential microfluidic devices,
from the inkjet printer to DNA sequencing chip.**

Hidden from view, microfluidics underlies a variety
of devices that are essential to our lives, from inkjet
printers to glucometers for the monitoring of diabetes.
Microfluidics—which refers to the technology of
miniature fluidic devices and the study of fluids at
submillimeter levels—is invisible to most of us because
it is hidden beneath ingenious user interfaces. In this
book, Albert Folch, a leading researcher in microfluidics,
describes the development and use of key microfluidic
devices. He explains not only the technology but also the
efforts, teams, places, and circumstances that enabled
these inventions.

Folch reports, for example, that the inkjet printer
was one of the first microfluidic devices invented, and
traces its roots back to nineteenth-century discoveries in
the behavior of fluid jets. He also describes how rapid
speed microfluidic DNA sequencers have enabled the
sequencing of animal, plant, and microbial species
genomes; organs on chips facilitate direct tests of drugs
on human tissue, leapfrogging over the usual stage of
animal testing; at-home pregnancy tests are based on
clever microfluidic principles; microfluidics can be used
to detect cancer cells in the early stages of metastasis;
and the same technology that shoots droplets of ink on
paper in inkjet printers enables 3D printers to dispense
layers of polymers. Folch tells the stories behind these
devices in an engaging style, accessible to nonspecialists.
More than 100 color illustrations show readers amazing
images of microfluids under the microscope.

Albert Folch is Professor in the Department of Bioengineering at the
University of Washington. He is the author of the widely used textbook
Introduction to BioMEMS and other books.

From Big Oil to Big Green

Holding the Oil Industry to Account for the
Climate Crisis

Marco Grasso

**How Big Oil can transform itself into Big Green
through reparation and decarbonization to rectify
the harm it has done through fossil fuels.**

In *From Big Oil to Big Green*, Marco Grasso examines the
responsibility of the oil and gas industry for the climate
crisis and develops a moral framework that lays out its
duties of reparation and decarbonization to allay the
harm it has done. By framing climate change as a moral
issue and outlining the industry's obligation to tackle it,
Grasso shows that Big Oil is a central, yet overlooked,
agent of climate ethics and policy.

Grasso argues that by indiscriminately flooding the
global economy with fossil fuels—while convincing
the public that halting climate change is a matter of
consumer choice, that fossil fuels are synonymous with
energy, and that a decarbonized world would take
civilization back to the Stone Age—Big Oil is morally
responsible for the climate crisis. He explains that it has
managed to avoid being held financially accountable for
past harm and that its duty of reparation has never been
theoretically developed or justified. With this book, he
fills those gaps. After making the moral case for climate
reparations and their implementation, Grasso develops
Big Oil's duty of decarbonization, which entails its
transformation into Big Green by phasing out carbon
emissions from its processes and, especially, its products.

Marco Grasso is Professor of Political Geography in the Department
of Sociology and Social Research at the University of Milano-Bicocca.
He is the author of *Justice in Funding Adaptation under the International
Climate Change Regime* and has published extensively in major scientific
journals.

Discard Studies

Wasting, Systems, and Power

Max Liboiron and Josh Lepawsky

An argument that social, political, and economic systems maintain power by discarding certain people, places, and things.

Discard studies is an emerging field that looks at waste and wasting broadly construed. Rather than focusing on waste and trash as the primary objects of study, discard studies looks at wider systems of waste and wasting to explore how some materials, practices, regions, and people are valued or devalued, becoming dominant or disposable. In this book, Max Liboiron and Josh Lepawsky argue that social, political, and economic systems maintain power by discarding certain people, places, and things. They show how the theories and methods of discard studies can be applied in a variety of cases, many of which do not involve waste, trash, or pollution.

Liboiron and Lepawsky consider the partiality of knowledge and offer a theory of scale, exploring the myth that most waste is municipal solid waste produced by consumers; discuss peripheries, centers, and power, using content moderation as an example of how dominant systems find ways to discard; and use theories of difference to show that universalism, stereotypes, and inclusion all have politics of discard and even purification—as exemplified in "inclusive" efforts to broaden the Black Lives Matter movement. Finally, they develop a theory of change by considering "wasting well," outlining techniques, methods, and propositions for a justice-oriented discard studies that keeps power in view.

Max Liboiron is Associate Professor of Geography at Memorial University of Newfoundland and Labrador and the author of *Pollution Is Colonialism*. **Josh Lepawsky** is Professor of Geography at Memorial University of Newfoundland and Labrador and the author of *Reassembling Rubbish* (MIT Press).

Power of Position

Classification and the Biodiversity Sciences

Robert D. Montoya

How biodiversity classification, with its ranking of species, has social and political implications as well as implications for the field of information studies.

The idea that species live in nature as pure and clear-cut named individuals is a fiction, as scientists well know. According to Robert D. Montoya, classifications are powerful mechanisms and we must better attend to the machinations of power inherent in them, as well as to how the effects of this power proliferate beyond the boundaries of their original intent. We must acknowledge the many ways our classifications are implicated in environmental, ecological, and social justice work—and information specialists must play a role in updating our notions of what it means to classify.

In *Power of Position*, Montoya shows how classifications are systems that relate one entity with other entities, requiring those who construct a system to value an entity's relative importance—by way of its position—within a system of other entities. These practices, says Montoya, are important ways of constituting and exerting power. Classification also has very real-world consequences. An animal classified as protected and endangered, for example, is protected by law. Montoya also discusses the Catalogue of Life, a new kind of composite classification that reconciles many local ("traditional") taxonomies, forming a unified taxonomic backbone structure for organizing biological data. Finally, he shows how the theories of information studies are applicable to realms far beyond those of biological classification.

Robert D. Montoya is Assistant Professor in the Department of Information Studies in the School of Education and Information Studies at the University of California, Los Angeles; Director of UCLA's California Rare Book School; and Director of UCLA's Library, Ethics, and Justice Lab.
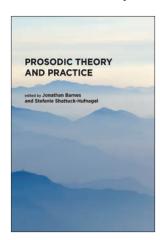
Prosodic Theory and Practice

**edited by Jonathan Barnes
and Stefanie Shattuck-Hufnagel**

An introduction to the the range of current theoretical approaches to the prosody of spoken utterances, with practical applications of those theories.

Prosody is an extremely dynamic field, with a rapid pace of theoretical development and a steady expansion of its influence beyond linguistics into such areas as cognitive psychology, neuroscience, computer science, speech technology, and even the medical profession. This book provides a set of concise and accessible introductions to each major theoretical approach to prosody, describing its structure and implementation and its central goals and assumptions as well as its strengths and weaknesses. Most surveys of basic questions in prosody are written from the perspective of a single theoretical framework. This volume offers the only summary of the full range of current theoretical approaches, with practical applications of each theory and critical commentary on selected chapters.

The current abundance of theoretical approaches has sometimes led to apparent conflicts that may stem more from terminological differences, or from differing notions of what theories of prosody are meant to achieve, than from actual conceptual disagreement. This volume confronts this pervasive problem head on, by having each chapter address a common set of questions on phonology, meaning, phonetics, typology, psychological status, and transcription. Commentary is added as counterpoint to some chapters, with responses by the chapter authors, giving a taste of current debate in the field.

Jonathan Barnes is Associate Professor of Linguistics at Boston University. **Stefanie Shattuck-Hufnagel** is Principal Research Scientist in the Speech Communication Group at MIT's Research Laboratory of Electronics.

linguistics

February | 7 x 10, 464 pp.

US $110.00X/$143.00 CAN paper
978-0-262-54317-0

Syntax in the Treetops

Shigeru Miyagawa

A proposal that syntax extends to the domain of discourse in making core syntax link to the conversational context.

In *Syntax in the Treetops*, Shigeru Miyagawa proposes that syntax extends into the domain of discourse by making linkages between core syntax and the conversational participants. Miyagawa draws on evidence for this extended syntactic structure from a wide variety of languages, including Basque, Japanese, Italian, Magahi, Newari, Romanian, and Spanish, as well as the language of children with autism. His proposal for what happens at the highest level of the tree structure used by linguists to represent the hierarchical relationships within sentences—"in the treetops"—offers a unique contribution to the new area of study sometimes known as "syntacticization of discourse."

Miyagawa's main point is that syntax provides the basic framework that makes possible the performance of a speech act and the conveyance of meaning; although the role that syntax plays for speech acts is modest, it is critical. He proposes that the speaker-addressee layer and the Commitment Phrase (the speaker's commitment to the addressee of the truthfulness of the proposition) occur together in the syntactic treetops. In each succeeding chapter, Miyagawa examines the working of each layer of the tree and how they interact.

Shigeru Miyagawa is Professor of Linguistics at MIT and the author of *Why Move? Why Agree?* and *Agreement Beyond Phi*, both also in the Linguistic Inquiry Monographs series.

linguistics

May | 6 x 9, 272 pp. | 66 illus.

US $50.00X/$66.00 CAN paper
978-0-262-54349-1

Linguistic Inquiry Monographs series

Northern Sparks

Innovation, Technology Policy, and the Arts in
Canada from Expo 67 to the Internet Age

Michael Century

**An "episode of light" in Canada sparked by Expo
67 when new art forms, innovative technologies,
and novel institutional and policy frameworks
emerged together.**

Understanding how experimental art catalyzes
technological innovation is often prized yet typically
reduced to the magic formula of "creativity." In *Northern
Sparks*, Michael Century emphasizes the role of policy
and institutions by showing how novel art forms and
media technologies in Canada emerged during a period
of political and social reinvention, starting in the 1960s
with the energies unleashed by Expo 67. Debunking
conventional wisdom, Century reclaims innovation from
both its present-day devotees and detractors by revealing
how experimental artists critically challenge as well as
discover and extend the capacities of new technologies.

Century offers a series of detailed cross-media case
studies that illustrate the cross-fertilization of art, tech-
nology, and policy. These cases span animation, music,
sound art and acoustic ecology, cybernetic cinema,
interactive installation art, virtual reality, telecom-
munications art, software applications, and the emergent
metadiscipline of human-computer interaction. They
include Norman McLaren's "proto-computational" film
animations; projects in which the computer itself became
an agent, as in computer-aided musical composition
and choreography; an ill-fated government foray into
interactive networking, the videotext system Telidon;
and the beginnings of virtual reality at the Banff Centre.
Century shows how Canadian artists approached new
media technologies as malleable creative materials, while
Canada undertook a political reinvention alongside its
centennial celebrations. *Northern Sparks* offers a uniquely
nuanced account of innovation in art and technology
illuminated by critical policy analysis.

Michael Century, a musician and media arts historian, is Professor of
Music and New Media at Rensselaer Polytechnic Institute. He founded
the Media Arts program at the Banff Centre for the Arts.

Four Shades of Gray

The Amazon Kindle Platform

Simon Rowberry

**This first book-length analysis of Amazon's Kindle
explores the platform's technological, bibliograph-
ical, and social impact on publishing.**

Four Shades of Gray offers the first book-length analysis
of Amazon's Kindle and its impact on publishing.
Simon Rowberry recounts how Amazon built the
infrastructure for a new generation of digital publica-
tions, then considers the consequences of having a
single company control the direction of the publishing
industry. Exploring the platform from the perspectives
of technology, texts, and uses, he shows how the Kindle
challenges traditional notions of platforms as discrete
entities. He argues that Amazon's influence extends
beyond "disruptive technology" to embed itself in all
aspects of the publishing trade; yet despite industry
pushback, he says, the Kindle has had a positive influ-
ence on publishing.

Rowberry documents the first decade of the Kindle
with case studies of Kindle Popular Highlights, an
account of the digitization of books published after
1922, and a discussion of how Amazon's patent filings
reflect a shift in priorities. Rowberry argues that while it
was initially convenient for the book trade to outsource
ebook development to Amazon, doing so has had
adverse consequences for publishers in the mid- and long
term, limiting opportunities for developing an inclusive
and forward-thinking digital platform. While it has
forced publishers to embrace digital forms, the Kindle
has also empowered some previously marginalized
readerships. Although it is still too early to judge the
long-term impact of ebooks compared with that of the
older technologies of clay tablets, the printing press, and
offset printing, the shockwaves of the Kindle continue to
shape publishing.

Simon Rowberry is Lecturer in Publishing at University College London.
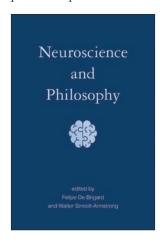
Neuroscience and Philosophy

edited by Felipe De Brigard and Walter Sinnott-Armstrong

Philosophers and neuroscientists address central issues in both fields, including morality, action, mental illness, consciousness, perception, and memory.

Philosophers and neuroscientists grapple with the same profound questions involving consciousness, perception, behavior, and moral judgment, but only recently have the two disciplines begun to work together. This volume offers fourteen original chapters that address these issues, each written by a team that includes at least one philosopher and one neuroscientist who integrate disciplinary perspectives and reflect the latest research in both fields. Topics include morality, empathy, agency, the self, mental illness, neuroprediction, optogenetics, pain, vision, consciousness, memory, concepts, mind wandering, and the neural basis of psychological categories.

The chapters first address basic issues about our social and moral lives: how we decide to act and ought to act toward each other, how we understand each other's mental states and selves, and how we deal with pressing social problems regarding crime and mental or brain health. The following chapters consider basic issues about our mental lives: how we classify and recall what we experience, how we see and feel objects in the world, how we ponder plans and alternatives, and how our brains make us conscious and create specific mental states.

Felipe De Brigard is Fuchsberg-Levine Family Associate Professor in the Department of Philosophy at Duke University and the Duke Institute for Brain Sciences, is Core Faculty at Duke's Center for Cognitive Neuroscience, and has a secondary appointment in the Department of Psychology and Neuroscience. **Walter Sinnott-Armstrong** is Chauncey Stillman Professor of Practical Ethics in the Philosophy Department and Kenan Institute for Ethics at Duke University, is Core Faculty at Duke's Center for Cognitive Neuroscience, and has secondary appointments in the Department of Psychology and Neuroscience and in the Duke University Law School.

Design in Motion

Film Experiments at the Bauhaus

Laura A. Frahm

The first comprehensive history in English of film at the Bauhaus, exploring practices that experimented with film as an adaptable, elastic "polymedium."

With *Design in Motion*, Laura Frahm proposes an alternate history of the Bauhaus—one in which visual media, and film in particular, are crucial to the Bauhaus's visionary pursuit of integrating art and technology. In the first comprehensive examination in English of film at the Bauhaus, Frahm shows that experimentation with film spanned a range of Bauhaus practices, from textiles and typography to stage and exhibition design. Indeed, Bauhausler deployed film as an adaptable, elastic "polymedium," malleable in shape and form, unfolding and refracting into multiple material, aesthetic, and philosophical directions.

Frahm shows how the encounter with film imbued the Bauhaus of the 1920s and early 1930s with a flexible notion of design, infusing painting with temporal concepts, sculptures with moving forms, photographs with sequential aesthetics, architectural designs with a choreography of movement. Frahm considers, among other things, student works that explored light and the transparent features of celluloid and cellophane; weaving practices that incorporate cellophane; experimental films, social documentaries, and critical reportage by Bauhaus women; and the proliferation of film strips in posters, book covers, and other typographic work.

Viewing the Bauhaus's engagement with film through a media-theoretic lens, Frahm shows how film became a medium for "design in motion." Movement and process, rather than stability and fixity, become the defining characteristics of Bauhaus educational, aesthetic, and philosophical ethos.

Laura A. Frahm is John L. Loeb Associate Professor of the Humanities at Harvard University. She is the author of *Jenseits des Raums* (*Beyond Space*) and *Bewegte Räume* (*Moving Spaces*).

Sex Sounds

Vectors of Difference in Electronic Music

Danielle Shlomit Sofer

An investigation of sexual themes in electronic music since the 1950s, with detailed case studies of "electrosexual music" by a wide range of creators.

In *Sex Sounds*, Danielle Shlomit Sofer investigates the repeated focus on sexual themes in electronic music since the 1950s. Debunking electronic music's origin myth—that it emerged in France and Germany, invented by Pierre Schaeffer and Karlheinz Stockhausen, respectively—Sofer defines electronic music more inclusively to mean any music with an electronic component, drawing connections between academic institutions, radio studios, experimental music practice, hip-hop production, and histories of independent and commercial popular music. Through a broad array of detailed case studies—examining music that ranges from Schaeffer's musique concrète to a video workshop by Annie Sprinkle—Sofer offers a groundbreaking look at the social and cultural impact sex has had on audible creative practices.

Sofer argues that "electrosexual music" has two central characteristics: the feminized voice and the "climax mechanism." Sofer traces the historical fascination with electrified sex sounds, showing that works representing women's presumed sexual experience operate according to masculinist heterosexual tropes, and presenting examples that typify the electroacoustic sexual canon. Noting electronic music history's exclusion of works created by women, people of color, women of color, and, in particular Black artists, Sofer then analyzes musical examples that depart from and disrupt the electroacoustic norms, showing how even those that resist the norms sometimes reinforce them. These examples are drawn from categories of music that developed in parallel with conventional electroacoustic music, separated—segregated—from it. Sofer demonstrates that electrosexual music is far more representative than the typically presented electroacoustic canon.

Danielle Shlomit Sofer is a music theorist and musicologist and cofounded the LGBTQ+ Music Study Group.

performing arts | music

July | 6 x 9, 408 pp. | 31 illus.

US $40.00X/$54.00 CAN paper
978-0-262-04519-3

The Art of Abduction

Igor Douven

A novel defense of abduction, one of the main forms of nondeductive reasoning.

With this book, Igor Douven offers the first comprehensive defense of abduction, a form of nondeductive reasoning. Abductive reasoning, which is guided by explanatory considerations, has been under normative pressure since the advent of Bayesian approaches to rationality. Douven argues that, although it deviates from Bayesian tenets, abduction is nonetheless rational. Drawing on scientific results, in particular those from reasoning research, and using computer simulations, Douven addresses the main critiques of abduction. He shows that versions of abduction can perform better than the currently popular Bayesian approaches—and can even do the sort of heavy lifting that philosophers have hoped it would do.

Douven examines abduction in detail, comparing it to other modes of inference, explaining its historical roots, discussing various definitions of abduction given in the philosophical literature, and addressing the problem of underdetermination. He looks at reasoning research that investigates how judgments of explanation quality affect people's beliefs and especially their changes of belief. He considers the two main objections to abduction, the dynamic Dutch book argument, and the inaccuracy-minimization argument, and then gives abduction a positive grounding, using agent-based models to show the superiority of abduction in some contexts. Finally, he puts abduction to work in a well-known underdetermination argument, the argument for skepticism regarding the external world.

Igor Douven is CNRS Research Professor at the Sorbonne and the author of *The Epistemology of Indicative Conditionals*.

philosophy

May | 6 x 9, 328 pp. | 23 illus.

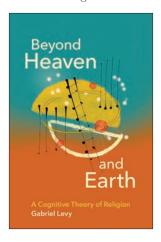**US $45.00X/$60.00 CAN paper**
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Beyond Heaven and Earth

A Cognitive Theory of Religion

Gabriel Levy

An approach to understanding religion that draws on both humanities and natural science but rejects approaches that employ simple monisms and radical dualisms.

In *Beyond Heaven and Earth*, Gabriel Levy argues that collective religious narratives and beliefs are part of nature; they are the basis for the formation of the narratives and beliefs of individuals. Religion grows out of the universe, but to make sense of it we have to recognize the paradox that the universe is both mental and material (or neither). We need both humanities and natural science approaches to study religion and religious meaning, Levy contends, but we must also recognize the limits of these approaches. First, we must make the dominant metaphysics that undergird the various disciplines of science and humanities more explicit, and second, we must reject those versions of metaphysics that maintain simple monisms and radical dualisms.

Bringing Donald Davidson's philosophy—a form of pragmatism known as anomalous monism—to bear on religion, Levy offers a blueprint for one way that the humanities and natural sciences can have a mutually respectful dialogue. Levy argues that in order to understand religions we have to take their semantic content seriously. We need to rethink such basic concepts as narrative fiction, information, agency, creativity, technology, and intimacy. In the course of his argument, Levy considers the relation between two closely related semantics, fiction and religion, and outlines a new approach to information. He then applies his theory to discrete cases: ancient texts, modern media, and intimacy.

Gabriel Levy is Professor of Religious Studies at the Norwegian University of Science and Technology in Trondheim, Norway, and the author of *Judaic Technologies of the Word*.

philosophy

February | 6 x 9, 264 pp. | 15 illus.
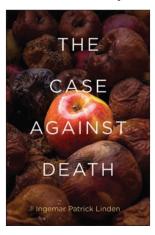
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The Case Against Death

Ingemar Patrick Linden

A philosopher refutes our culturally embedded acceptance of death, arguing instead for the desirability of anti-aging science and radical life extension.

Ingemar Patrick Linden's central claim is that death is evil. In this first comprehensive refutation of the most common arguments in favor of human mortality, he writes passionately in favor of anti-aging science and radical life extension. We may be on the cusp of a new human condition, where scientists seek to break through the arbitrarily set age limit of human existence, to address aging as an illness that can be cured. The book, however, is not about the science and technology of life extension but whether we should want more life. For Linden, the answer is a loud and clear "yes."

The acceptance of death is deeply embedded in our culture. Linden examines the views of major philosophical voices of the past, whom he calls "death's ardent advocates." These include the Buddha, Socrates, Plato, Lucretius, and Montaigne. All have taught what he calls "the Wise View," namely, that we should not fear death. After setting out his case against death, Linden systematically examines each of the accepted arguments for death—that aging and death are natural, that death is harmless, that life is overrated, that living longer would be boring, and that death saves us from overpopulation. He concludes with a "dialogue concerning the badness of human mortality." Though Linden acknowledges that *The Case Against Death* is a negative polemic, he also defends it as optimistic, in that the badness of death is a function of the goodness of life.

Ingemar Patrick Linden taught philosophy at NYU for nearly a decade. He is researching public attitudes to radical life extension.

philosophy

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Basic Bioethics series

Quotations as Pictures

Josef Stern

The proposal of a semantics for quotations using explanatory notions drawn from philosophical theories of pictures.

In *Quotations as Pictures*, Josef Stern develops a semantics for quotations using explanatory notions drawn from philosophical theories of pictures. He offers the first sustained analysis of the practice of quotation proper, as opposed to mentioning. Unlike other accounts that treat quotation as mentioning, *Quotations as Pictures* argues that the two practices have independent histories, that they behave differently semantically, that the inverted commas employed in both mentioning and quotation are homonymous, that so-called mixed quotation is nothing but subsentential quotation, and that the major problem of quotation is to explain its dual reference or meaning—its ordinary meaning and its metalinguistic reference to the quoted phrase attributed to the quoted subject.

Stern argues that the key to understanding quotation is the idea that quotations are pictures or have a pictorial character. As a phenomenon where linguistic competence meets a nonlinguistic symbolic ability, the pictorial, quotation is a combination of features drawn from the two different symbol systems of language and pictures, which explains the exceptional and sometimes idiosyncratic data about quotation. In light of this analysis of verbal quotation, in the last chapters Stern analyzes scare quotation as a nonliteral expressive use of the inverted commas and explores the possibility of quotation in pictures themselves.

Josef Stern is William H. Colvin Professor of Philosophy Emeritus at the University of Chicago and was the Inaugural Director of the Joyce Z. and Jacob Greenberg Center for Jewish Studies. He is the author of *Metaphor in Context* (MIT Press), *The Matter and Form of Maimonides' Guide*, and other books.

philosophy

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Transforming Nuclear Safeguards Culture

The IAEA, Iraq, and the Future of Non-Proliferation

Trevor Findlay

The role of organizational culture in international efforts to stop the spread of nuclear weapons.

In *Transforming Nuclear Safeguards Culture*, Trevor Findlay investigates the role that organizational culture may play in preventing the spread of nuclear weapons, examining particularly how it affects the nuclear safeguards system of the International Atomic Energy Agency (IAEA), the paramount global organization in the non-proliferation field. Findlay seeks to identify how organizational culture may have contributed to the IAEA's failure to detect Iraq's attempts to acquire illicit nuclear capabilities in the decade prior to the 1990 Gulf War and how the agency has sought to change safeguards culture since then. In doing so, he addresses an important piece of the nuclear nonproliferation puzzle: how to ensure that a robust international safeguards system, in perpetuity, might keep non-nuclear states from acquiring such weapons.

Findlay, as one of the leading scholars on the IAEA, brings a valuable holistic perspective to his analysis of the agency's culture. *Transforming Nuclear Safeguards Culture* will inspire debate about the role of organizational culture in a key international organization—a culture that its member states, leadership, and staff have often sought to ignore or downplay.

Trevor Findlay is a Principal Fellow at the School of Social and Political Sciences at the University of Melbourne. He is the author of *Nuclear Energy and Global Governance: Ensuring Safety, Security and Nonproliferation*, *Unleashing the Nuclear Watchdog: Strengthening and Reform of the International Atomic Energy Agency*, and several other books and publications.

political science

May | 6 1/8 x 9 1/4, 288 pp. | 4 illus.

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Belfer Center Studies in International Security

Certifying China

The Rise and Limits of Transnational Sustainability Governance in Emerging Economies

Yixian Sun

A comprehensive study of the growth, potential, and limits of transnational eco-certification in China and the implications for other emerging economies.

China has long prioritized economic growth over environmental protection. But in recent years, the country has become a global leader in the fight to save the planet by promoting clean energy, cutting air and water pollution, and developing a system of green finance. In *Certifying China*, Yixian Sun explores the potential and limits of transnational eco-certification in moving the world's most populous country toward sustainable consumption and production. He identifies the forces that drive companies from three sectors—seafood, palm oil, and tea—to embrace eco-certification. The success of eco-certification, he says, will depend on the extent to which it wins support of domestic actors in fast-growing emerging economies.

The assumption of eco-certification is that demand along the supply chain can drive businesses to adopt good practices for social, environmental, and economic sustainability by specifying rules for production, third-party verification, and product labeling. Through case studies drawn from extensive fieldwork and mixed methods, Sun traces the processes by which certification programs originating from the Global North were introduced in China and gradually gained traction. He finds that the rise of eco-certification in the Chinese market is mainly driven by state actors, including government-sponsored industry associations, who seek benefits of transnational governance for their own development goals. The book challenges the conventional wisdom that the Chinese state has little interest in supporting transnational governance, offering novel insights into the interaction between state and non-state actors in earth system governance in emerging economies.

Yixian Sun is a Lecturer (Assistant Professor) in International Development at the University of Bath, UK.

political science | environment

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Earth System Governance series

Virtually Amish

Preserving Community at the Internet's Margins

Lindsay Ems

How the Amish have adopted certain digital tools in ways that allow them to work and live according to their own value system.

The Amish are famous for their disconnection from the modern world and all its devices. But, as Lindsay Ems shows in *Virtually Amish*, Old Order Amish today are selectively engaging with digital technology. The Amish need digital tools to participate in the economy—websites for ecommerce, for example, cell phones for communication on the road—but they have developed strategies for making limited use of these tools while still living and working according to the values of their community. The way they do this, Ems suggests, holds lessons for all of us about resisting the negative forces of what has been called "high-tech capitalism."

Ems shows how the Amish do not allow technology to drive their behavior; instead, they actively configure their sociotechnical world to align with their values and protect their community's autonomy. Drawing on extensive ethnographic fieldwork conducted in two Old Order Amish settlements in Indiana, Ems explores explicit rules and implicit norms as innovations for resisting negative impacts of digital technology. She describes the ingenious contraptions the Amish devise—including "the black-box phone," a landline phone attached to a device that connects to a cellular network when plugged into a car's cigarette lighter—and considers the value of human-centered approaches to communication. Non-Amish technology users would do well to take note of Amish methods of adopting digital technologies in ways that empower people and acknowledge their shared humanity.

Lindsay Ems is Assistant Professor of Communication and Media Studies at Butler University.

"The Amish—unlikely to be digital influencers—show us one way to draw on culture to regain control over our digital future. This compelling account of Amish resistance to digitization provides a surprising model for the rest of us."

—Adam Fish, Scientia Associate Professor, University of New South Wales

science, technology, and society

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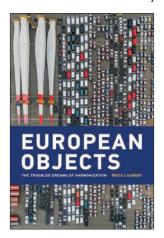978-0-262-54363-7

Acting with Technology series

European Objects

The Troubled Dreams of Harmonization

Brice Laurent

How interventions based on objects—including chemicals, financial products, and consumer goods—offer a path to rethink European integration.

Interventions based on objects, Brice Laurent claims, have become a dominant path for European policy-making. In *European Objects*, Laurent analyzes the political consequences of these interventions and their democratization. He uses the term "European objects" to describe technical entities that are regulated—and thereby transformed—by European policies. To uncover the bureaucratic and regulatory intricacies of European governance, Laurent focuses on a series of these objects, including food products, chemicals, financial products, consumer goods, drinking water, and occupational environments. Laurent argues that taking European objects seriously offers a way to rephrase the dreams of harmonization and, eventually, rethink the constitutional strength of European integration.

Laurent doesn't just clarify how European regulation works, but also explores ways to realize long-term objectives for European integration, such as a harmonized market or an objective expertise. Regulation is best understood as "regulatory machinery" bringing together various types of legal constraints, material interventions on objects, and the imagining of desirable futures. Analyzing European objects enables Laurent to explore what regulation has become after years of evolution have made it a central component of the European policy world. He offers practical illustrations of how the regulatory machinery functions today. If Europe succeeds at reinventing the terms of its legitimacy with objects that matter for the European publics, it will provide a telling demonstration that the opposition of expertise and populism is not the unavoidable fate of liberal democracies.

Brice Laurent is a researcher at Mines ParisTech, Centre de Sociologie de l'Innovation.

science, technology, and society

February | 6 x 9, 280 pp. | 2 illus.

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US Physical and Engineering Scientists in the Long 1970s

Cyrus C. M. Mody

When ungroovy scientists did groovy science: how non-activist scientists and engineers adapted their work to a rapidly changing social and political landscape.

In *The Squares*, Cyrus Mody shows how, between the late 1960s and the early 1980s, some scientists and engineers who did not consider themselves activists, New Leftists, or members of the counterculture accommodated their work to the rapidly changing social and political landscape of the time. These "square scientists," Mody shows, began to do many of the things that the counterculture urged: turn away from military-industrial funding, become more interdisciplinary, and focus their research on solving problems of civil society. During the period Mody calls "the long 1970s," ungroovy scientists were doing groovy science.

Mody offers a series of case studies of some of these collective efforts by non-activist scientists to use their technical knowledge for the good of society. He considers the region around Santa Barbara and the interplay of public universities, think tanks, established firms, new companies, philanthropies, and social movement organizations. He looks at Stanford University's transition from Cold War science to commercialized technoscience; NASA's search for a post-Apollo mission; the unsuccessful foray into solar energy by Nobel laureate Jack Kilby; the "civilianization" of the US semiconductor industry; and systems engineer Arthur D. Hall's ill-fated promotion of automated agriculture.

Cyrus C. M. Mody is Professor of the History of Science, Technology, and Innovation and Director of the Maastricht University Science, Technology and Society Studies program. He is the author of *Instrumental Community: Probe Microscopy and the Path to Nanotechnology* and *The Long Arm of Moore's Law: Microelectronics and American Science* (both published by the MIT Press).

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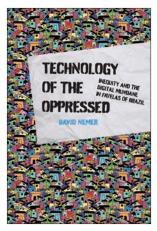978-0-262-54361-3

Inside Technology series

Technology of the Oppressed

Inequity and the Digital Mundane in Favelas of Brazil

David Nemer

How Brazilian favela residents engage with and appropriate technologies, both to fight the oppression in their lives and to represent themselves in the world.

Brazilian favelas are impoverished settlements usually located on hillsides or the outskirts of a city. In *Technology of the Oppressed*, David Nemer draws on extensive ethnographic fieldwork to provide a rich account of how favela residents engage with technology in community technology centers and in their everyday lives. Their stories reveal the structural violence of the information age. But they also show how those oppressed by technology don't just reject it, but consciously resist and appropriate it, and how their experiences with digital technologies enable them to navigate both digital and nondigital sources of oppression—and even, at times, to flourish.

Nemer uses a decolonial and intersectional framework called Mundane Technology as an analytical tool to understand how digital technologies can simultaneously be sites of oppression and tools in the fight for freedom. Building on the work of the Brazilian educator and philosopher Paulo Freire, he shows how the favela residents appropriate everyday technologies—technological artifacts (cell phones, Facebook), operations (repair), and spaces (Telecenters and Lan Houses)—and use them to alleviate the oppression in their everyday lives. He also addresses the relationship of misinformation to radicalization and the rise of the new far right. Contrary to the simplistic techno-optimistic belief that technology will save the poor, even with access to technology these marginalized people face numerous sources of oppression, including technological biases, racism, classism, sexism, and censorship. Yet the spirit, love, community, resilience, and resistance of favela residents make possible their pursuit of freedom.

David Nemer is Assistant Professor of Media Studies at the University of Virginia.

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We experience the sublime—overwhelming amazement and exhilaration—in at least seven different forms. Gazing from the top of a mountain at a majestic vista is not the same thing as looking at a city from the observation deck of a skyscraper; looking at images constructed from Hubble Space Telescope data is not the same as living through a powerful earthquake. The varieties of sublime experience have increased during the last two centuries, and we need an expanded terminology to distinguish between them. In this book, David Nye delineates seven forms of the sublime: natural, technological, disastrous, martial, intangible, digital, and environmental, which express seven different relationships to space, time, and identity.

These forms of the sublime can be experienced at historic sites, ruins, cities, national parks, or on the computer screen. We find them in beautiful landscapes and gigantic dams, in battle and on battlefields, in images of black holes and microscopic particles. The older forms are tangible, when we are physically present and our senses are fully engaged; increasingly, others are intangible, mediated through technology. Nye examines each of the seven sublimes, framed by philosophy but focused on historical examples.

David E. Nye is Senior Research Fellow at the University of Minnesota's Charles Babbage Institute and Professor Emeritus of American Studies at the University of Southern Denmark. The author of twelve books with the MIT Press, including *American Technological Sublime*, he was awarded the Leonardo da Vinci Medal in 2005 and was knighted by the Queen of Denmark in 2013.

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Art, Science, and the Politics of Knowledge

Hannah Star Rogers

How the tools of STS can be used to understand art and science and the practices of these knowledge-making communities.

In *Art, Science, and the Politics of Knowledge*, Hannah Star Rogers suggests that art and science are not as different from each other as we might assume. She shows how the tools of science and technology studies (STS) can be applied to artistic practice, offering new ways of thinking about people and objects that have largely fallen outside the scope of STS research. Arguing that the categories of art and science are labels with specific powers to order social worlds—and that art and science are best understood as networks that produce knowledge—Rogers shows, through a series of cases, the similarities and overlapping practices of these knowledge communities.

The cases, which range from nineteenth-century artisans to contemporary bioartists, illustrate how art can provide the basis for a new subdiscipline called art, science, and technology studies (ASTS), offering hybrid tools for investigating art–science collaborations. Rogers's subjects include the work of father and son glassblowers, the Blaschkas, whose glass models, produced in the nineteenth century for use in biological classification, are now displayed as works of art; the physics photographs of documentary photographer Berenice Abbott; and a bioart lab that produces work functioning as both artwork and scientific output. Finally, Rogers, an STS scholar and contemporary art–science curator, draws on her own work to consider the concept of curation as a form of critical analysis.

Hannah Star Rogers is Visiting Scholar at the University of Edinburgh in Science, Technology, and Innovation Studies (STIS) and lead editor of the *Routledge Handbook of Art, Science, and Technology Studies*.

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